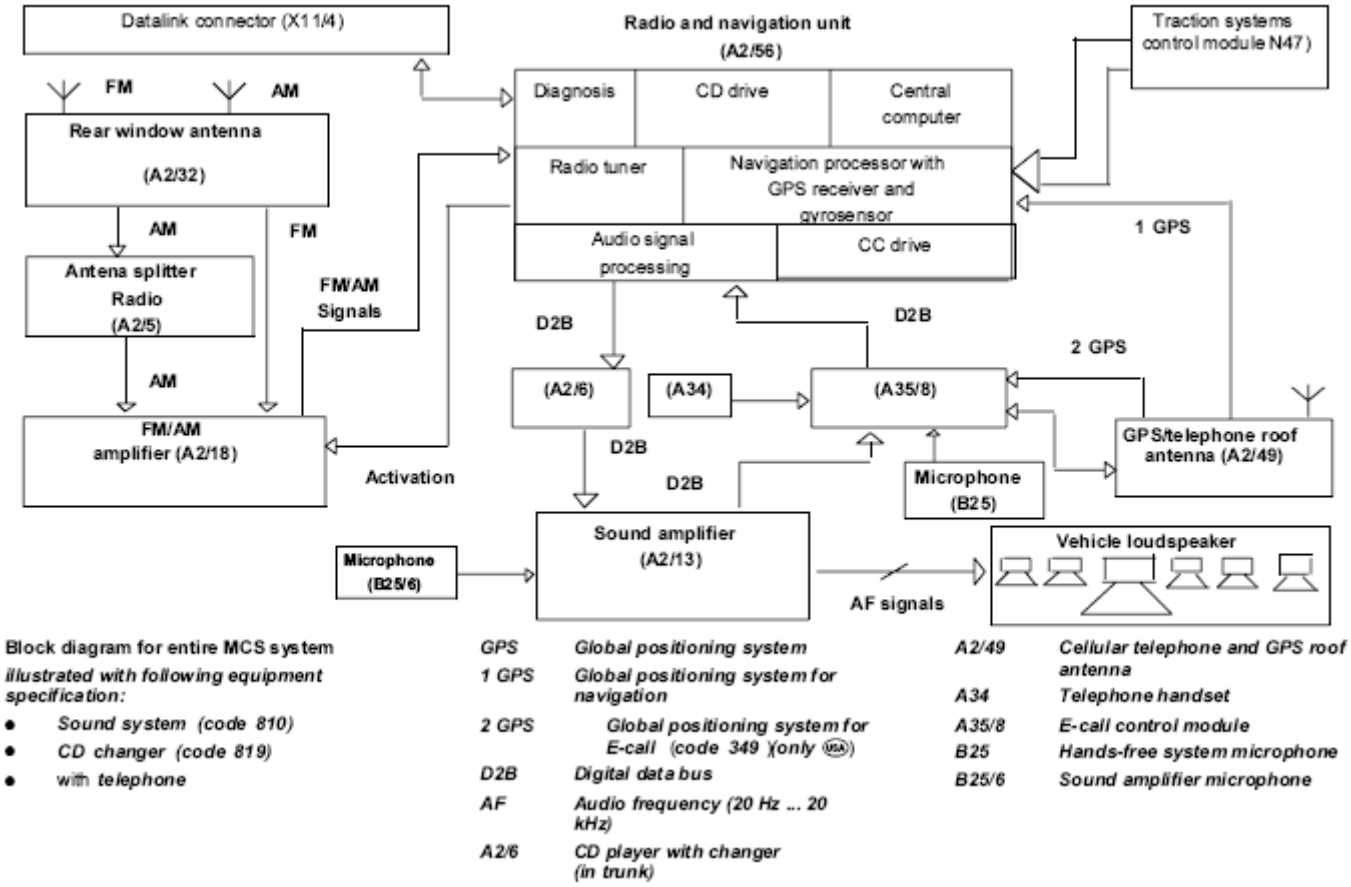


Fig. 83: MCS System Block Diagram

MCS system

The **radio and navigation unit (A2/56)** is the central component of the MCS system . It has a video-capable **5" active matrix TFT display** for indicating information such as control menus and map data for navigation. Actuation is accomplished in operating modes **NTSC** (US standard) **PAL** (ECE standard). It is operated with fixed function keys and a rotary knob, a **joystick** as well as with menu-guidance on the display.

The basic version of the **radio and navigation unit (A2/56)** is equipped with

- a radio reception unit,
- a compact cassette player and
- a speed-dependent volume control.

Diagnostic interface

To read out actual values and DTC's of the MCS and components connected via the digital data bus (**D2B**) diagnosis with the hand-held tester is possible via a K-line.

MCS bus system

The digital components of the **radio and navigation unit (A2/56)** are interlinked via the digital data bus (**D2B**). Control data, audio signals and other information are transmitted between the various system components via the digital data bus (**D2B**) Since some of the individual components operate with various data formats or place different requirements on the transmission speed and transmission security, various bus systems are installed.

	Switch on/off behavior, function		**GF82.85-P-2006GI**
	Radio operation, function		**GF82.60-P-2001GI**
	CD-player mode, function		**GF82.60-P-2002GI**
	Telephone mode, function		**GF82.85-P-2007GI**
	Cassette mode, function		**GF82.85-P-2010GI**
	Navigation mode, function		**GF82.85-P-2012GI**
	Volume/tone adjustments, function		**GF82.60-P-2003GI**
	Radio/navigation unit location/task/design/ function		**GF82.61-P-4109GI**

MODULAR CONTROL SYSTEM (MCS) FUNCTION DESCRIPTION CONTENTS - GF82.85-P-0995GIZ

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (819) 6-disk CD changer with CODE (491) U.S. version

	Modular control system (MCS), function	* for USA only	**GF82.85-P-0011GI**
	Switch on/off behavior, function		**GF82.85-P-2006GI**
	Radio operation, function		**GF82.60-P-2001GI**
	CD-player mode, function		**GF82.60-P-2002GI**
	Telephone mode, function		**GF82.85-P-2007GI**
	Starguide, function		**GF82.85-P-2014GI**
	Information service, function		**GF82.85-P-3016GI**
	Data transmission for Starguide, function		**GF82.85-P-3017GI**
	Cassette mode, function		**GF82.85-P-2010GI**
	Navigation mode, function		**GF82.85-P-2012GI**
	Voice output, function		**GF82.85-P-3001GI**
	Volume/tone adjustments, function		**GF82.60-P-2003GI**
	Constant map matching, function		**GF82.61-P-2002GI**
	Basic location finding, function		**GF82.61-P-3006GI**

	Global positioning system location finding, function		**GF82.61-P-3007GI**
	Map-supported location finding, function		**GF82.61-P-3008GI**
	Route calculation, function		**GF82.61-P-3011GI**
	Dynamic route guidance, function		**GF82.61-P-4003GI**
	Guidance, function		**GF82.61-P-3012GI**
	Destination guidance in digitized map area, function		**GF82.61-P-4000GI**
	Destination guidance in non-digitized map area, function		**GF82.61-P-4001GI**
	Modular control system (MCS) survey of system components location/task/design/ function		**GF82.85-P-9995GIZ**

CONTENTS, FUNCTION DESCRIPTION OF COCKPIT MANAGEMENT AND DATA SYSTEM (COMAND) - GF82.85-P-0997GHZ

MODEL 163

	Cockpit management and data system (COMAND) function		GF82.85-P-0003GH
	Switch-on/switch-off characteristics, function		GF82.85-P-2006GH
	Radio operation, function		GF82.60-P-2001GH
	CD-player mode, function		GF82.60-P-2002GH
	Volume/tone adjustments, function		GF82.60-P-2003GH
	Navigation mode, function		**GF82.85-P-2012GH**
	Constant map matching, function		GF82.61-P-2002GH
	Basic location finding, function		GF82.61-P-3006GH
	Global positioning system location finding, function		GF82.61-P-3007GH
	Map-supported location finding, function		GF82.61-P-3008GH
	Route computation, function		GF82.61-P-3011GH
	Destination-finding system, function		GF82.61-P-3012GH
	Destination finding in digitized map area, function		GF82.61-P-4000GH
	Destination finding in non-digitized map area, function		GF82.61-P-4001GH
	Dynamic destination finding, function	With dynamic destination finding (code 815) not for	GF82.61-P-4003GH

		USA	
	CTEL mode, function	For MB CTEL standard (code 853) or MB portable CTEL (code 854).	GF82.85-P-2007GH
	Voice command, function		GF82.85-P-3001GH
	Table of contents, function description of antenna system (ATS)		GF82.62-P-0999B
	Overview of system components for cockpit management and data system (COMAND), location/task/design/function		**GF82.85-P-9997GHZ**

SWITCH ON/OFF BEHAVIOR, FUNCTION - GF82.85-P-2006B

MODEL 163, 168, 170, 203.0 /2 /7, 208, 209.3 /4, 210 with CODE (353) Audio 30 APS

ON/off characteristics

The radio (A2) is switched on by pressing the "ON" button. The radio (A2) likewise switches On automatically by rotating the ignition key (models 163, 168, 170, 208, 210) or transmitter key (A8/1) (models 203, 209) into position 1 "circuit 15R ON", provided that it was switched on immediately before the last time "circuit 15R ON" was switched off. However, if the radio (A2) was switched off last, only the following components are activated with "circuit 15R ON":

- Digital databus (D2B)
- Continuous location finding

In this case the display on the radio (A2) remains Off. This allows quick availability of the system when the "ON" button is then actuated.

Following each switch-on operation, the system returns to the state in which it was before it was last switched off (e.g. navigation basic menu).

i The bus systems and navigation processor for location finding (for quicker readiness for operation) are already activated when the driver door is opened.

Switch off characteristics

The system is switched off by switching off at the "ON" button or when "circuit 15R ON" is switched off.

The unit switches off automatically after an hour, if when switching on the ignition key (models 163, 168, 170, 208, 210) or transmitter key (A8/1) (models 203, 209) has not been inserted in the ignition switch.

Run-on time/navigation

The data on the current navigation are stored for 12 hours after the radio (A2) is switched off.

	Radio operation, function		**GF82.60-P-2001B**
	CD-player mode, function		**GF82.60-P-2002B**
	Telephone mode, function	Model 209	GF82.85-P-2007QA
	Navigation mode, function	Model 163, 168, 170,208,210 Model 203, 209	**GF82.85-P-2012B** GF82.85-P-2012EE

SWITCH-ON/OFF CHARACTERISTICS, FUNCTION - GF82.85-P-2006GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

Switch-on characteristics

Activation of entire system

When the ignition/starter switch is turned to position **1(c.15R, ON**) the **display is switched on** , if the **radio and navigation module (A2/56)** has been switched on before the ignition key was removed the last time.

The **radio and navigation module (A2/56)** is now ready for operation. The system active before the last switch-off (e.g. radio) is switched on and the corresponding basic menu displayed. If the **radio and navigation module (A2/56)** has been switched off for longer than **60 min** a warning display appears with general specifications for using the system.

i When a telephone call is received the **radio and navigation module (A2/56)** switches on automatically.

Behavior when rotary knob is pressed

The **radio and navigation module (A2/56)** can also be switched on the when the **remote control key (A8/1) is removed** by **actuating** the rotary knob.

All functions are then available for **60 min** . After expiration of **60 min** the **radio and navigation module (A2/56)** switches off automatically.

This function can only be repeated by actuating the rotary knob again.

Switch-off characteristics

The **radio and navigation module (A2/56)** can be switched off by turning the ignition key to position **0 c. 15C, OFF**).

When the rotary knob is actuated in the switched-on state the **radio and navigation module (A2/56)** can be switched off.

Switch-off characteristics when voltage is too low

The central processor in the **radio and navigation module (A2/56)** permanently monitors the battery voltage. Depending on the voltage value the system will act as follows:

- **The battery voltage less than 9.5 volts**

If the battery voltage drops below **9.5 volts** the **radio and navigation module (A2/56)** switches off automatically.

If the system **switches off** and the voltage increases to greater than **9.5 volt the radio and navigation module (A2/56) does not switch back on automatically.**

If the system switches off it can be switched back on **manually** .

	Radio mode, function		**GF82.60-P-2001GI**
	CD-player mode, function		**GF82.60-P-2002GI**
	Telephone mode, function		**GF82.85-P-2007GI**
	Cassette mode, function		**GF82.85-P-2010GI**
	Navigation mode, function		**GF82.85-P-2012GI**

TELEPHONE MODE, FUNCTION - GF82.85-P-2007GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

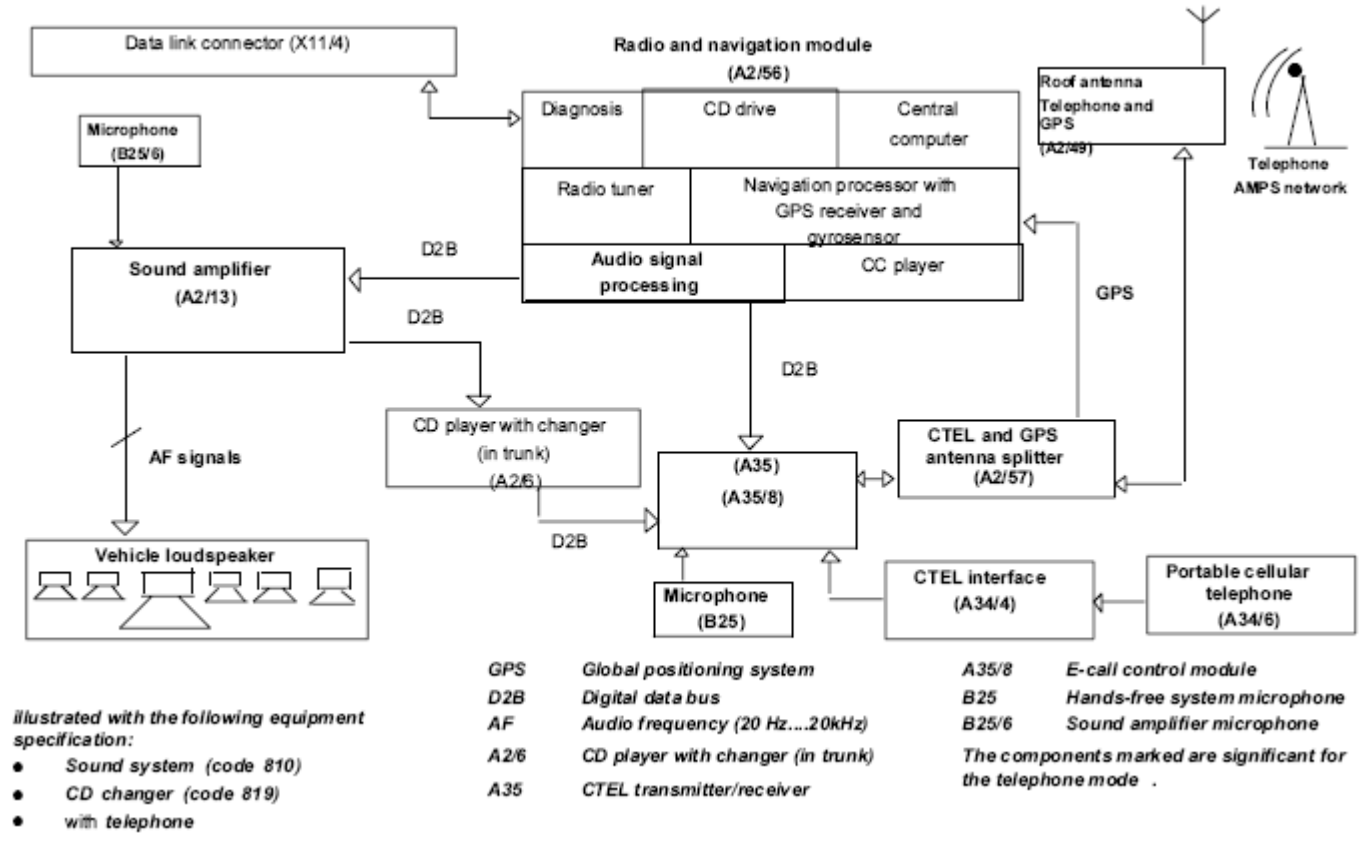


Fig. 84: MCS Telephone System Block Diagram

The telephone system can be operated as follows:

- directly on the **radio and navigation module (A2/56)** or
- **with the portable cellular telephone (A34/6)** or
- with the **telephone handset (A34)**

Making a call, function

The data telegrams (e.g. button actuation) for controlling the telephone system are relayed to the telephone transmitter/receiver (A35) from the **radio and navigation module (A2/56)** via the digital data bus (**D2B**)

The actual telephone connection is completed by the **CTEL/GPS antenna splitter (A2/57) and the CTEL and GPS roof antenna (A2/49)**

The audio source is automatically muted during a telephone call.

After switching over to the telephone mode the following display appears:

- Strength of received **signal** (illustrated with **5 beams**)
- Message indicating readiness for telephone mode with "**Ready** " display.

- Multifunction keys **"NUM "** and **"NAME** ".
- **Entering code**

  The telephone can be protected against undesired use by entering a **three** - digit code. All telephone functions are disabled except the emergency call function.

The telephone can be enabled again by entering the **three** - digit code (correction possible with " **Clear** " button in the event of incorrect entry) and actuation of the multifunction key" **OK** ".

The following functions are available in the **telephone** mode:

- **Emergency call function**

  This function offers the possibility of transmitting an emergency call within the reception range of the radio telephone network. The **emergency call** number is stored in the **memory location 1** and can be called even when the telephone is disabled. The emergency call is performed by pressing and holding **control button 1** down longer than **1 second " EMERGENCY** " appears on the display. An emergency call can be terminated by pressing " the "**END** " button.

- **Manual entry of telephone number**

  Telephone numbers can be entered manually on the number pad.

An incorrectly entered number can be deleted by momentarily pressing the " **CLEAR** " button. If the" **CLEAR** " button is pressed for longer than **2 s** all telephone numbers deleted

i If the number entered consists of only 1 or 2 numbers, the telephone number stored in the memory with this code is dialed.

The entered telephone number can be transmitted to the telephone by pressing the " **SEND** " button. The telephone compares the transmitted telephone number with the telephone number stored in the memory. If the numbers coincide the associated name, the memory location number and the telephone appear on the display (depending on setting).

If the numbers do not coincide, the telephone number entered is still displayed.

Then the connection can be completed. The duration of the telephone call is indicated in minutes and seconds. The call can be terminated by pressing the " **END** " button.

- **Selecting stored telephone number**

  The memory can be called up by pressing the multifunction key" **NAME** " or "**NUM** "."**NAME** " indicates the stored names on the display" **NUM** " indicates the memory location number as well as the associated telephone number. By pressing the" **joystick** " up or down the stored entries are displayed. Pressing to the right or left causes display of the next **4** entries or previous **4** entries.

i If a name is not available for the stored telephone number, the display is switched over and the memory location and the telephone number are displayed.

By manually entering **1** or **2** numbers and subsequent actuation of the multifunction key" **NAME** " or "**NUM** " the name stored under this memory location number or the stored telephone number are indicated.

Pressing " **SEND** " button completes the desired connection. If no connection is to be completed, the memory area can be exited by pressing the multifunction key" **EXIT** ".

- **Quick dial**

  When a one or two-digit number is entered and the " **SEND** " button is actuated the telephone number stored under this memory location number is dialed.

- By pressing and holding one of the number buttons **1** to **9** for more than **2 s** the telephone number stored under this memory location number is dialed. In this case it is not necessary to actuate the " **SEND** " button.

  i **Memory location functions 1** number is reserved for **emergency** !

- **Redialing**

  Pressing the" **SEND** " button without previously entering a telephone number calls up the last **5** selected telephone numbers on the display. It is possible to select the desired telephone number by pressing the" **joystick** " up or down. The connection is completed by actuating the" **SEND** " button. This area can be exited by pressing the multifunction key" **EXIT** ".

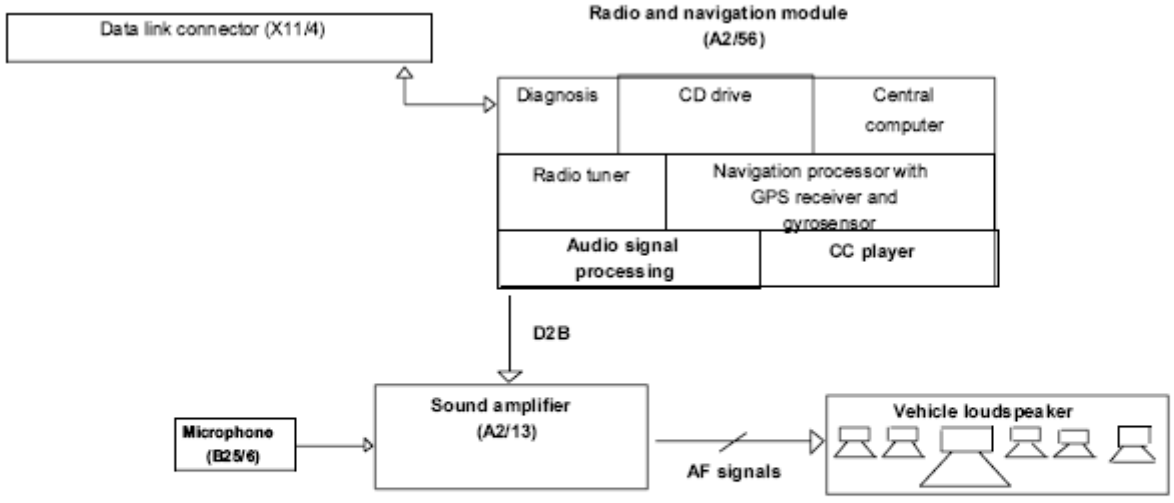
- **Incoming calls**

  During an incoming call all other audio sources are set to mute and "**CALL** " appears on the display. The call can be accepted by pressing the " **SEND** " button or terminated by pressing the" **END** " button. During a call it is possible to continue dialing, e.g. enter a code number for an answering machine.

	GPS roof antenna/telephone, location/purpose/ design/function		**GF82.70-P-4111A**

CASSETTE MODE, FUNCTION - GF82.85-P-2010GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version



Block diagram for MCS cassette mode
illustrated with the following equipment:
- *Sound system (code 810)*

Abbreviations
D2B Digital data bus
AF Audio frequency (20 ... 20 kHz)

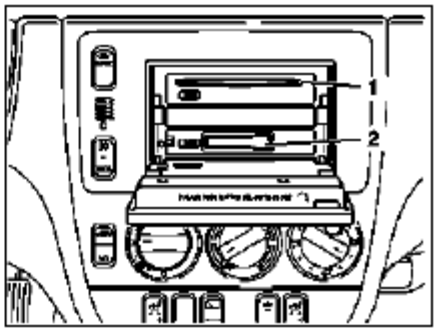
The components marked are significant for the cassette mode .

Fig. 85: MCS Cassette Mode Block Diagram

Playback of compact discs

When the" **Open** " button is pressed the display opens automatically releasing the slot for the **c** ompact cassettes (**CC**) and **c** ompact **d** iscs (**CD**). When the **radio and navigation module (A2/56)** is switched on the **CC** is pulled in automatically after it has been inserted beyond a pressure point. Then the playback of the **CC** starts with side **1** which is the side of the **CC** pointing upward. If a **CC** is defective or is wound too tightly, the message (" **Tape Error, Tape may be to tight** ") appears on the display.

1 CD slot
2 CC slot



P82.85-5237-01

Fig. 86: Identifying CD Slot And CC Slot

The following functions are available for playback of the **CC** :

- **Auto reverse**

By pressing the multifunction key" **Side** " the side of the **CC** can be changed. This is indicated on the display by" **Side 1** " or" **Side 2** ". The side changes **automatically** when the end of the tape is reached.

- **Fast forward/rewind**

  Pressing the "**joystick** " to the **left right** causes the **CC** to be wound backward and forward at high speed. The procedure can be stopped by pressing the" **joystick** " again in any direction. When the end of the tape is reached the side is changed **automatically** and playback continues.

- **Music search**

  The music search feature can be started by pressing the " **joystick** " upward for forward or downward for rewind. During the search "**MS FWD** " or "**MSREW** " appears on the display. As soon as sufficiently large pause (**approx. 3 s**) is recognized, the search stops and playback starts automatically. The search can be stopped manually by pressing the" **joystick** " in any direction.

- **Scan function**

  The multifunction key" **Scan** " causes all titles on the **CC** to be played for **approx. 8 s** . . Pressing the multifunction key" **Scan** " again stops this procedure.

- **Dolby B**

  Actuating multifunction key" **Dolby** " activates this function. The Dolby system appears inverted on the display. Pressing again deactivates this function.

- **Pause "II"**

  The following events cause the function to change from "**Play** " to "**Pause** ":

  - Pressing multifunction key "**Pause** " (display changes from "**II** " to "**Play** ").
  - By an incoming or outgoing call
  - Switching over to another audio mode.

- **Pause recognition**

  Pressing the multifunction key" **Skip** " activates or deactivates the pause recognition function. If a pause of more than **15 s** . is recognized the drive changes **automatically** to fast forward. If this function is activated the display appears inverted.

	Volume/tone adjustments, function		**GF82.60-P-2003GI**

NAVIGATION MODE, FUNCTION - GF82.85-P-2012B

MODEL 163, 168, 170, 208, 210 with CODE (353) Audio 30 APS

Audio 30 APS block diagram in navigation mode

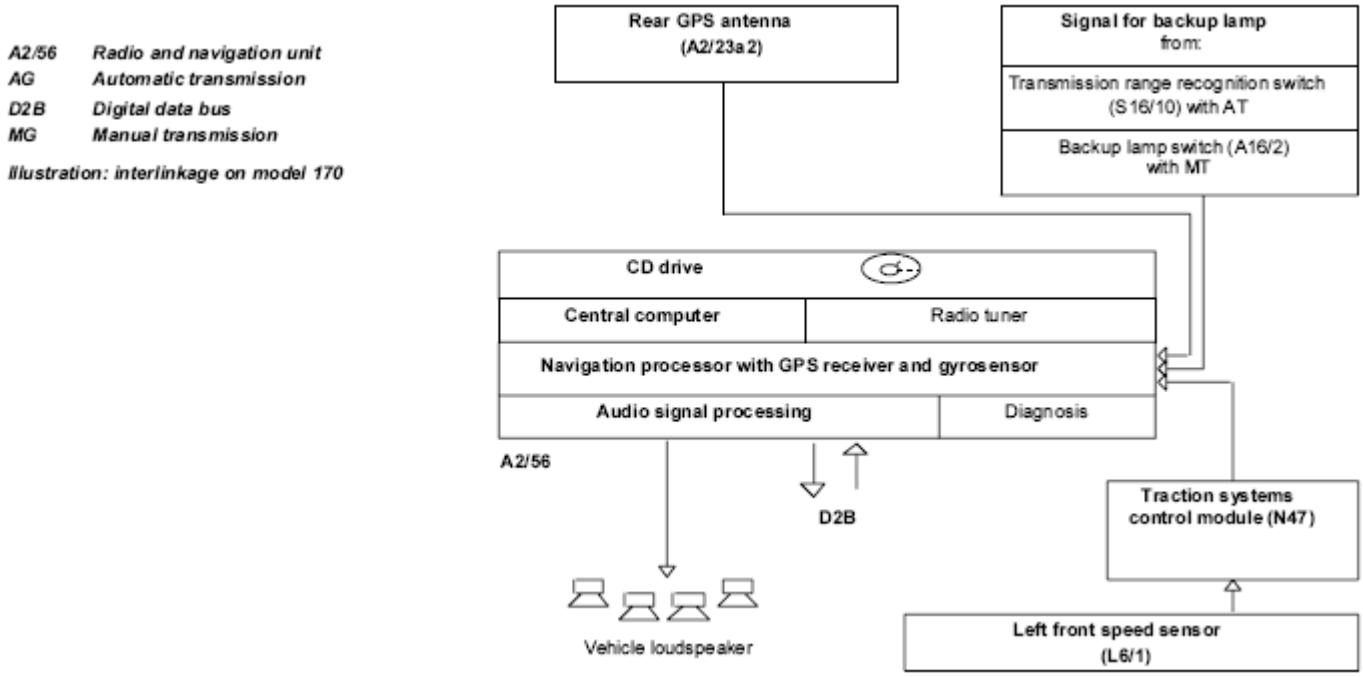


Fig. 87: Audio 30 APS In Navigation Mode Block Diagram

The **location of the vehicle** as well as the **direction and distance to the destination** (according to destination entered) is determined with the aid of the navigation system. Then the required measures to reach the destination are started **(guidance)** .

The navigation system can be activated by pressing the "NAV" button on the **radio and navigation unit (A2/56)** .

A **navigation processor** with CD-ROM drive is integrated into the **radio and navigation unit (A2/56)** for reading in the navigation data (digital map, speech segments and software).

i The navigation CD-ROM drive can also be used to play audio CDs.

Entering destination

The destination can be entered with menu guidance on the **radio and navigation unit (A2/56)** and processed by the **navigation processor** . The system only allows entry of destination addresses stored on the CD-ROM.

The following possibilities are available for entering a destination:

- Call-up of destination stored in destination memory
- Free entry of destination with menu guidance based on name (when destination is stored on CD-ROM)

Location finding

The navigation processor continuously calculates the location of the vehicle with the aid of the following procedures:

- GPS location finding
- Basic location finding (dead reckoning)
- Map-supported location finding (map matching)

The correct position is determined by continuously comparing the locating result of these three procedures.

Route calculation

The route is calculated in the **navigation processor** according to the destination entered, or automatically, after deviating from the recommended route. The recommended route is stored in the navigation processor

Guidance

After the navigation processor has calculated the route, guidance is started. The driver receives continuous information with the aid of guidance symbols appearing on the display of the **radio and navigation unit (A2/56)** and **voice announcements** on the vehicle loudspeaker.

	Audio 30 APS block diagram	Model 163	**GF82.61-P-0002-02D**
		Model 168 Model 170 Models 208, 210	GF82.61-P-0002-02B GF82.61-P-0002-02A GF82.61-P-0002-02C
	Basic location finding (dead reckoning), function		**GF82.61-P-3006D**
	Global positioning system (GPS) location finding, function		**GF82.61-P-3007C**
	Map-assisted location finding, function		**GF82.61-P-3008C**
	Route calculation, function		**GF82.61-P-3011E**
	Destination guidance, function		**GF82.61-P-3012D**
	Loading language, function		**GF82.61-P-3003B**
	Volume and tone settings		GF82.60-P-2003A
	Radio mode, function		**GF82.60-P-2001B**
	CD player mode, function		**GF82.60-P-2002B**
	Radio and navigation unit, location/purpose/ design/function		**GF82.61-P-4109A**
	CTEL and GPS roof antenna, location/purpose/ design/function	Models 163, 168,208.3,210	**GF82.70-P-4111A**
	Global positioning system antenna, location/ purpose/design/function	Models 170, 208.4	GF82.61-P-4106A
	Antenna splitter,	Model 163	**GF82.85-P-3107B**

	location/purpose/design/ function		

NAVIGATION MODE, FUNCTION - GF82.85-P-2012GH

MODEL 163

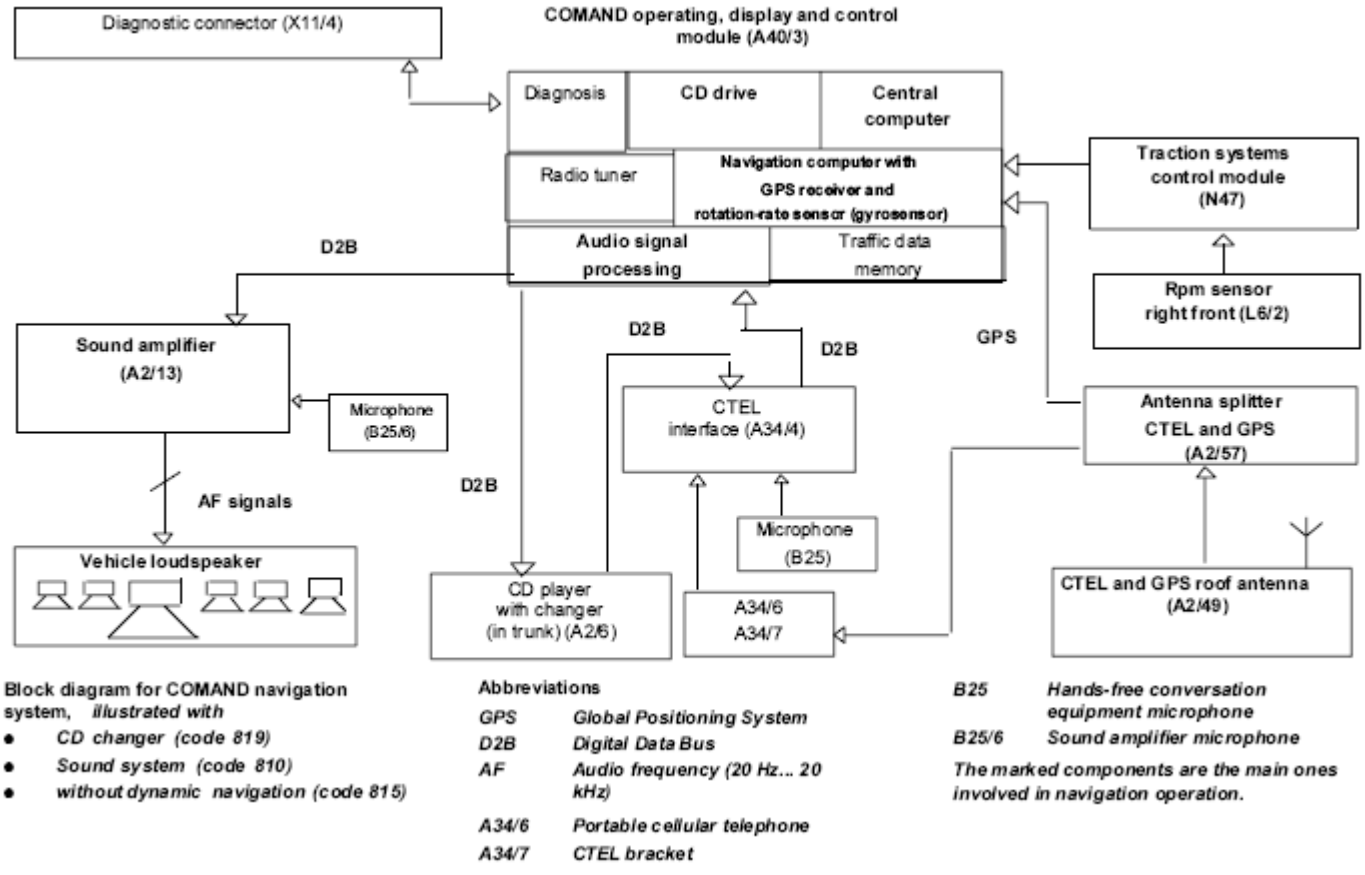


Fig. 88: COMAND Navigation System Block Diagram

Function

The navigation system is integrated into the **COMAND operating, display and control module (A40/3)** . The **location of the vehicle** and the **direction to and distance from the destination** (according to specified destination) are determined with the aid of this system. Afterwards the required measures for reaching the destination are initiated **(destination finding)** .

The navigation system is activated by pressing the " **NAVI** " button on the operating unit.

A **navigation processor** with **CD drive** for the digital map data is integrated in the **COMAND operating, display and control module (A40/3)** .

i The navigation **CD** drive can also play **audio CDs** .

i Note in **Navi-CD screen** :

"**Please insert Navi-CD type DX** "

Destination entry

Destination input is performed menu-guided on the operating unit and processed by the **navigation processor** . Only destinations that are also on the **CD-ROM** may be entered. The **COMAND operating, display and control module (A40/3)** provides the following destination input capabilities:

- Address...
- Destination memory...
- Destination using map...
- Special destinations (e.g. railway station, airport etc.)
- Travel guide...
- Intermediate destination entry
- Destination memory with individual destination designation capabilities
- Final destination...
- Dynamic route calculation by:
  - Blocking of route sections (traffic-jam function)
  - Traffic-jam ahead
  - Blocking in route list
- Incorporation of traffic information of an external service provider via telephone **TCS** (once, cyclic every **t=15min.**). Chargeable services.
- Incorporation of traffic information via RDS broadcast (**TMC**), free of charge

Predictive speller (editor)

During the entry of the destination the missing letters are augmented for an available list. This is only active in the **political index** and relates to the **destination** and **road** entry as part of the destination finding. In the menu **Special destinations** the submenus" **Bypassing other locations...** " and "**National destinations...** "are assisted.

The "**Supraregional destination...** " menu is divided up into additional submenues. The **individual menu points** in this submenu use the **political index** .

Dynamic addition

implemented during manual entry of the destination. During the entry of the destination the missing letters are augmented for an available list. The added letters are highlighted in black. Deleting is done one character at a time.

Position finding

COMAND continuously calculates the location of the vehicle with the aid of the following procedures:

- **GPS** position finding
- **Basic** position finding (compound position finding)
- **Map-supported** position finding (map matching)

The **navigation computer** calculates the most probable position by continuously comparing the position-finding results returned by these three methods.

Route calculation

The route is calculated by the **navigation processor** after entering the destination, or automatically, after a deviation from the suggested route has taken place.

In the **dynamic destination-finding system** the route calculation is automatically influenced by the incorporation of traffic information, free of charge via **RDS, TMC** or over an external provider **TCS** by telephone (chargeable).

The calculated route is stored in the **navigation processor** .

Destination-finding system

Destination finding is started once the navigation computer has performed the destination calculation.

Three display options are available for graphical representation of the destination-finding system:

1. with map
2. with map and symbol display before turn-off point

   --> MIX mode

3. with symbol display only (route guidance symbols)

Any of the three methods can be used. The destination-finding system is also supported by **voice output** from the vehicle loudspeakers.

	Route computation, function		GF82.61-P-3011GH
	Constant map matching, function		GF82.61-P-2002GH
	Basic location finding, function		GF82.61-P-3006GH
	Destination-finding system, function		GF82.61-P-3012GH
	Destination finding in		GF82.61-P-4000GH

	digitized map area, function		
	Destination finding in non-digitized map area, function		GF82.61-P-4001GH
	Volume/tone adjustments, function		GF82.60-P-2003GH
	Global positioning system location finding, function		GF82.61-P-3007GH

NAVIGATION MODE, FUNCTION - GF82.85-P-2012GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

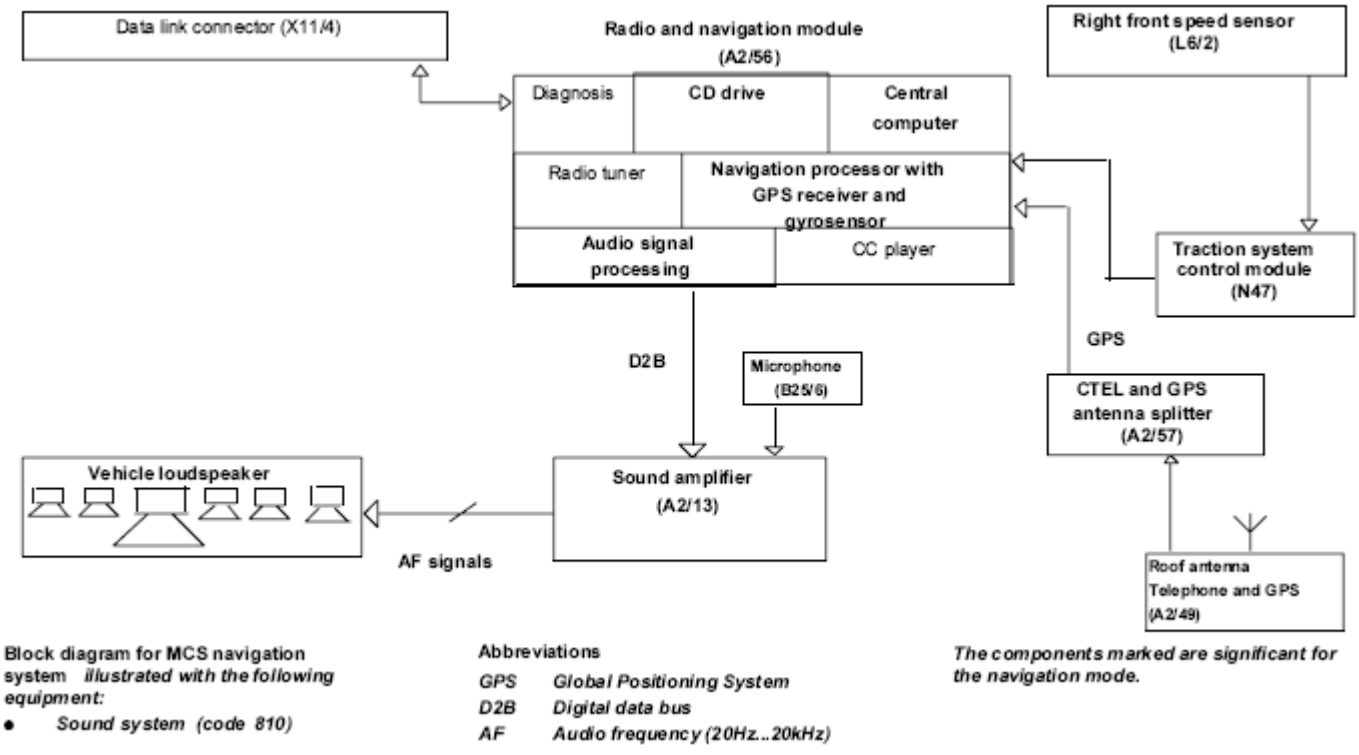


Fig. 89: Identifying MCS Navigation System Block Diagram

Function

The navigation system (optional) is integrated into the **radio and navigation module (A2/56)** .

With this system the **vehicle location** and the **direction** and **distance to destination** (after entering destination) are determined. Then the required measures are taken to reach the destination (**guidance**) .

The navigation system can be activated by pressing the" **NAVI** " button on the control module.

A **navigation processor** with **CD** drive for the **digital** map data is integrated (optional) into the radio and navigation module (A2/56)

i The navigation **CD** drive can also play audio **CD's** .

Destination entry

The destination can be entered with menu-guidance on the control module and is processed by the **navigation processor** . It is only possible to enter destinations which are stored on the **CD-ROM** .

Location finding

the **radio and navigation module (A2/56)** continuously calculates the vehicle location with the aid of the following procedures:

- GPS location finding
- Basic location finding (dead reckoning)
- Map-supported location finding (map matching)

The **navigation processor** calculates the most probable position by permanently comparing the location results of these **three** methods.

Route calculation

The route calculation is accomplished in the **navigation processor** after the destination is entered or **automatically** following a deviation from the suggested route.

The calculated route is stored in the **navigation processor** .

Route guidance

After the navigation processor has calculated the route guidance starts.

Route guidance is accomplished graphically with a **digital** map with direction arrows as well as with the aid of the **voice output** on the vehicle loudspeakers. When the " **NAVI VOICE** " button is pressed the last current navigation command is repeated. The volume of the voice output can be set on the volume knob during a navigation command. The following functions are available in the navigation mode:

When the" **NAVI MENU** " button is actuated the main navigation menu opens.

All other entries can be made with the " **joystick** ".

- **"Dest"** (destination entry)**radio and navigation module (A2/56)** offers the following possibilities for destination entry:

- Address
- Junction (intersection)
- Selecting hotel, church or point of interest
- Direct entry on map (map cursor)
- Calling up stored destination (recent route)
- Address book
- Selection of address in date book (today's plan)

After selecting one of these possibilities, e.g. address, it is possible to proceed with the entry of additionally required information. Incorrect entries can be erased with " **Delete** " Spaces can be entered with " **Space** ".

After completely entering the information confirm by pressing the "**joystick** " (Ent).

"**OK to proceed** " starts calculation of the route.

- **Setup** (settings)

  Various settings for the screen display and route guidance can be made with this menu.

- **Option** (selection)

  With this menu information, e.g. location, can be called up.

  Entries in address book, in date book or in list of last driven routes can be processed by selecting correspondingly.

- **Route**

  This menu provides settings influencing the current route guidance.

  i This menu can only be called up during route guidance.

- **Detour multifunction key**

  Pressing the multifunction key" **DETR** " causes the navigation processor to calculate the closest possible alternative route, e.g. in the case of traffic jams, constructions sites, etc.

- **STOP multifunction key**

  Route guidance can be terminated by pressing multifunction key" **STOP** ".

- **LIST multifunction key**

  Pressing multifunction key" **LIST** " calls up a list of roads to be driven in the current route guidance.

- **MUTE multifunction key**

  Muting voice output.

- **MAP multifunction key**

  Changing between map display and direction arrow display

  i Pressing the "**Clear** " key returns to the previous menu.

	Constant map matching, function		**GF82.61-P-2002GI**
	Route calculation, function		**GF82.61-P-3011GI**
	Guidance, function		**GF82.61-P-3012GI**
	Voice output, function		**GF82.85-P-3001GI**
	Volume/tone adjustments, function		**GF82.60-P-2003GI**

STARGUIDE, FUNCTION - GF82.85-P-2014GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

The **StarGuide system** uses the availability of the present technologies for telecommunications.

These are used for the purpose of personal information services.

i The service "**Dynamic route guidance** " will be added to the system at a later time.

Technical requirements:

- E-Call and
- MCS and
- newest navigation **CD** (it includes the current software for executing the offered services). The MCS is updated with this and
- the prerequisites required for executing the corresponding systems are fulfilled.

Organizational prerequisites:

- GPS **G** lobal **P** ositioning **S** ystem. Satellite-supported system for precise positioning and navigation. At present **26** satellites are in operation orbiting the earth on **6** orbits.
- AMPS: **A** dvanced **M** obile **P** hone **S** ystem. The AMPS network is now available to **98% of the population in the most densely-populated areas of the USA** .
- SOC: **S** ervice **O** perating Center. The **SOC** takes over all individual requirements of the driver and transmits the corresponding information to the vehicle.

Concept of personal information service:

- Individual information and news transmission according to personal interest profile (stock exchange, weather, sport...)
- Transmitting a request via a button (**SVC** button) to the **S** ervice **O** perating **C** enter (**SOC**)
- e **S** ervice **O** perating **C** enter (**SOC**) transmits the customer profile corresponding to the individual information and news.
- The data transmitted is indicated on the display of the **radio and navigation module (A2/56)** and can then be read.

	Information service, function		**GF82.85-P-3016GI**
	Data transmission for Starguide, function		**GF82.85-P-3017GI**

VOICE OUTPUT, FUNCTION - GF82.85-P-3001GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

MCS voice output block diagram for navigation illustrated with the following equipment:

- *Sound system (code 810)*

The components marked are significant for the voice output.

Abbreviations:

D2B	*Digital data bus*
GPS	*Global positioning system*
AF	*Audio frequency (20 ... 20 kHz)*

i *In ⓘ without traffic data recording*

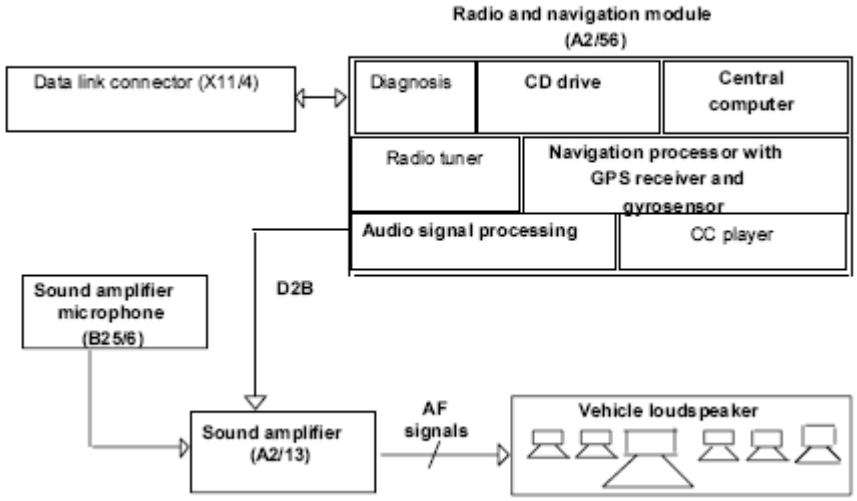


Fig. 90: MCS Voice Output Block Diagram

The **navigation system guidance** feature is supported significantly by **voice output** .

The voice data was originally stored as single-word segments on the navigation **CD-ROM** . This data set is transmitted automatically by the **CD-ROM** to the navigation processor and stored there.

The **navigation processor** interlinks these word segments to complete instructions or information and generates corresponding **AF** signals. The generated **AF** signals are transmitted internally in the **radio and navigation module (A2/56)** to the audio signal processing if required, amplified there and output via the vehicle loudspeakers.

With the **sound system (code 810)** the voice signals are transmitted to the sound amplifier (A2/13) from the audio signal processing via the digital data bus (**D2B**), amplified there, and then output via the vehicle loudspeakers.

i Several short, sequential drive recommendations are compiled to one single voice output.

Loading voice from CD-ROM

Only English is presently available for voice output on the **radio and navigation module (A2/56)** .

Volume of voice output

The voice output volume can be adjusted **during voice output** . This ensures that a defined interval is maintained between the volume of the current audio source and voice output.

Example:

If the volume is reduced during voice output and the preceding volume interval to the audio signal is not reached the **radio and navigation module (A2/56)**

reduces the level of the audio signal until the specified volume interval is reached again. The volume of the audio signal is then again increased after completion of the voice output to the level present before the voice output.

Moreover, the volume of the voice output cannot be reduced below a certain **minimum level** .

Voice output mute circuit

Navigation voice output can be muted by actuating the mute multifunction key. Muting remains active until the mute multifunction key is pressed again.

	Navigation mode, function		**GF82.85-P-2012GI**
	Radio and navigation module, location/purpose/ design/function		**GF82.61-P-4109GI**

INFORMATION SERVICE, FUNCTION - GF82.85-P-3016GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

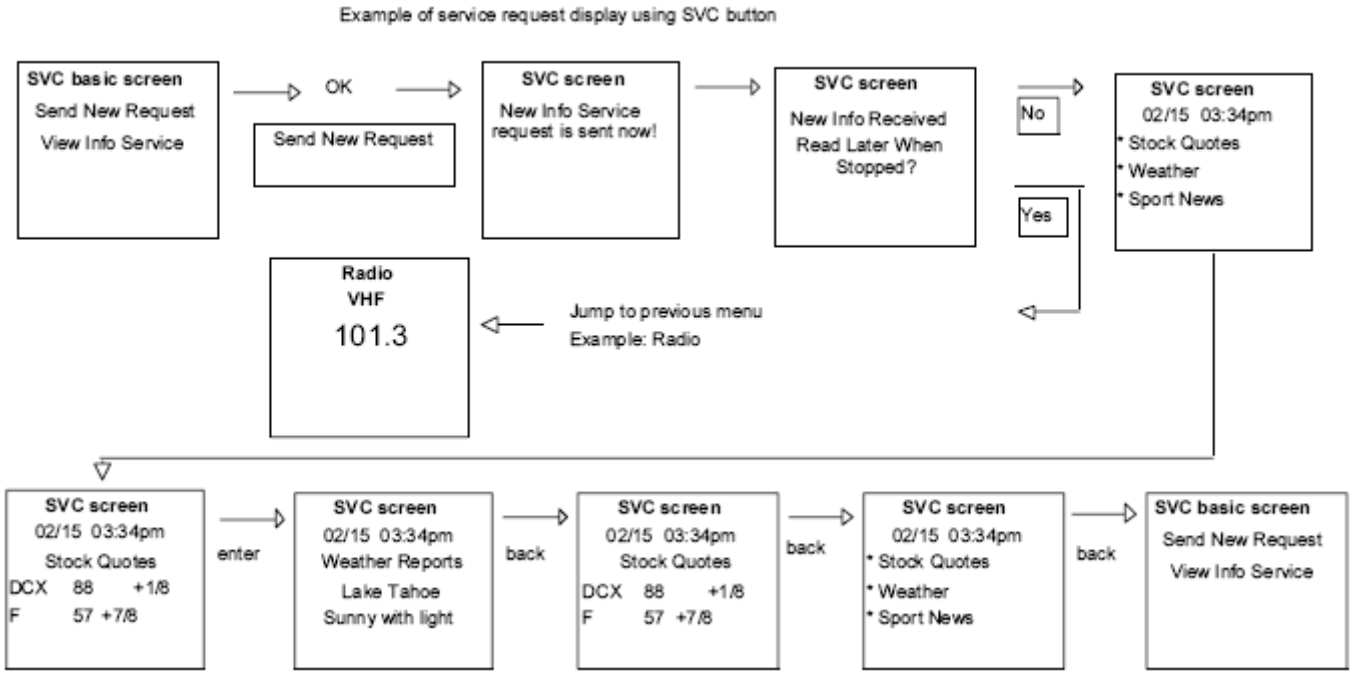


Fig. 91: Service Request Display Using SVC Button (Example)

Service request procedure

It is possible to change to the service mode with the button " **SVC** " on the **radio and navigation module**

(A2/56) .

A new request is selected in the basic screen " **SVC** ":

- **"Send New Request for Info Service "**

or optionally:

- **"View Info Service of..."**

allows a previous data record to be viewed.

Selection is possible with the knob/pushbutton on the **radio and navigation module (A2/56)** and confirmed by pressing. If" **Send New Request for Info Service** " is selected, the **radio and navigation module (A2/56)** transmits this request via the digital data bus (**D2B**) to the **E-call control module (A35/8)** and **CTEL transmitter/receiver (A35)** . It transmits the request to the service provider via the present telephone network.

The request is processed on the Internet on the basis of the personal information profile and sent to the vehicle via the telephone network.

A tone and the message:" **New Info Received!** " indicates reception to the user. The safety question:" **Read Later When Stopped?** " with the decision " **Yes** " or "**No** " serves for traffic safety.

Selecting:" **Yes** " leads to a return to the previous menu such as radio, CD, navigation.....

Selecting:" **No** " lists the news according to the personal interest profile.

The messages can be read in sequence. **Pressing** the knob/ pushbutton button on the **radio and navigation module (A2/56)** jumps to the next news item. **Turning** the knob/pushbutton on the **radio and navigation module (A2/56)** scrolls the news. With the" **BACK** " button on the **radio and navigation module (A2/56)** it is always possible to jump back to the previous menu.

i The information that is received can be read page by page. It is not possible to jump directly to a certain page. The format can be changed by the operator.

	Starguide, function	As of 09/00	**GF82.85-P-2014GI**
	Data transmission for Starguide, function	As of 09/00	**GF82.85-P-3017GI**

DATA TRANSMISSION FOR STARGUIDE, FUNCTION - GF82.85-P-3017GI

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (316) MB GSM cellular telephone (D2B) with CODE (818b) Single CD player - additional unit with CODE (491) U.S. version

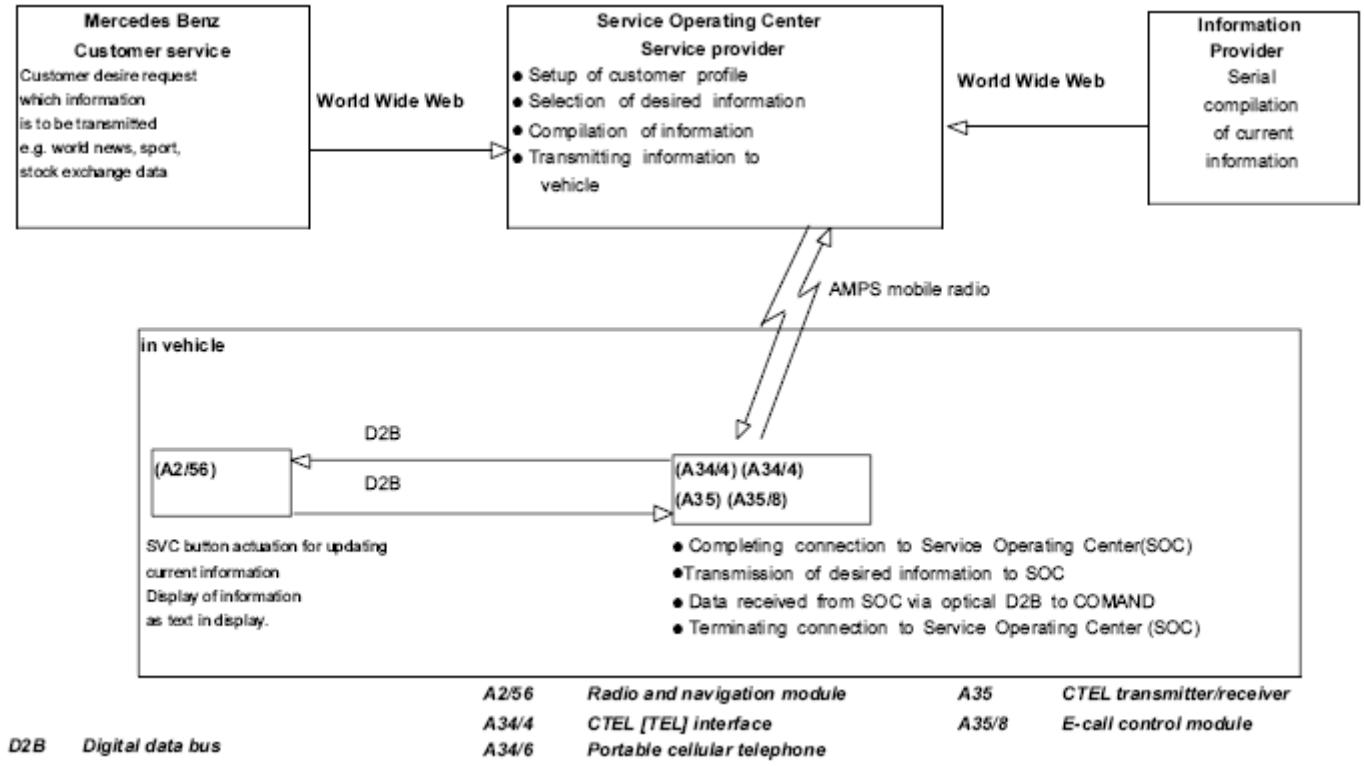


Fig. 92: Connection Schematic Between Vehicle And Center Via Mobile Telephone

System concept of information service:

The vehicle owner determines his own interest profile for service information such as world news or stock exchange data. He transmits the desired information to the Mercedes Benz Customer Service. This profile is indicated to the **S** ervice **O** peration Center (**SOC**).

With the" **SVC** " button on the **radio and navigation module (A2/56)** it is possible to transmit an update request for service information to the **S** ervice **O** perating **C** enter (**SOC**).

In the **S** ervice **O** peration **C** enter (**SOC**) this customer profile is used for selecting information. The desired information is compiled by the information provider and transmitted to the vehicle via the **S** ervice **O** peration **C** enter (**SOC**).

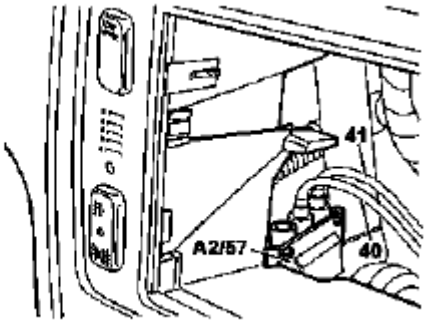
The data transmitted is indicated on the display in the **radio and navigation module (A2/56)** .

	Starguide, function		**GF82.85-P-2014GI**
	Information service, function		**GF82.85-P-3016GI**
	Telephone mode, function		**GF82.85-P-2007GI**
	Modular control system (MCS), function		**GF82.85-P-0011GI**

ANTENNA SPLITTER, LOCATION - GF82.85-P-3107-01B

Model 163 with code 353

A2/57	*CTEL and GPS antenna splitter*
40	*Coaxial cable for CTEL and GPS roof antenna (A2/49)*
41	*Coaxial cable to GPS receiver*



P82.61-2343-01

Fig. 93: Identifying Antenna Splitter Location

i ***It is possible to connect a GSM telephone to the connector not specified using a coaxial cable.***

ANTENNA SPLITTER, DESIGN - GF82.85-P-3107-03B

Model 163 with code 353

The **CTEL and GPS antenna splitter (A2/57)** consists of the following components:

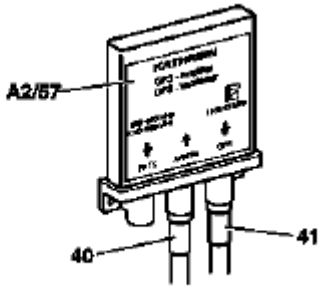
- Active frequency splitter with GPS antenna amplifier
- Coaxial connection socket for **CTEL and GPS roof antenna (A2/49)**
- Coaxial connection socket for GSM telephone
- Coaxial connection socket for GPS receiver

i The power for the **CTEL and GPS antenna splitter (A2/57)** is supplied via coaxial cable from the GPS receiver (phantom feed).

ANTENNA SPLITTER, DESIGN - GF82.85-P-3107-03GH

Model 163 up to 31.08.01

A2/57	*CTEL and GPS antenna splitter*
40	*Connection for coaxial cable of CTEL and GPS roof antenna (A2/49)*
41	*Connection for coaxial cable to GPS receiver*



P82.61-2304-01

Fig. 94: Identifying CTEL And GPS Antenna Splitter Design

i ***A GSM cellular telephone can be connected by means of a coaxial cable to the non-designated connection.***

The **CTEL and GPS antenna splitter (A2/57)** consists of the following components:

- Active frequency splitter with **GPS** antenna amplifier
- Coaxial socket for the **CTEL and GPS roof antenna (A2/49)**
- Coaxial socket for a **GSM** CTEL
- Coaxial socket for a **GPS** receiver

i The voltage for the **CTEL and GPS antenna splitter (A2/57)** is supplied via the coaxial cable from the GPS receiver (**phantom feed**).

ANTENNA SPLITTER, FUNCTION - GF82.85-P-3107-04B

Model 163 with code 353

The **CTEL and GPS antenna splitter (A2/57)** has the following functions:

- Separating the signals received from the **CTEL and GPS roof antenna (A2/49)** :

  The GSM and GPS signals are received by the antenna splitter via an antenna lead and leave the **CTEL and GPS antenna splitter (A2/57)** via two separate coaxial cables. In addition the GPS signals are amplified.

- Decoupling the GPS receiver from the GSM telephone transmitter:

  It must be ensured that the telephone transmitter signals do not reach the GPS receiver. The **CTEL and GPS antenna splitter (A2/57)** allows them to pass only in the direction of the roof antenna.

ANTENNA SPLITTER, FUNCTION - GF82.85-P-3107-04GH

Model 163 up to 31.08.01

The **CTEL and GPS antenna splitter (A2/57)** has the following functions:

- Separating the receiving signals from the **CTEL and GPS roof antenna (A2/49)** :

  The **GSM** and the **GPS** signals are received along an antenna cable at the antenna splitter and leave the **CTEL and GPS antenna splitter (A2/57)** in two separate coaxial cables. The GPS signals are additionally amplified.

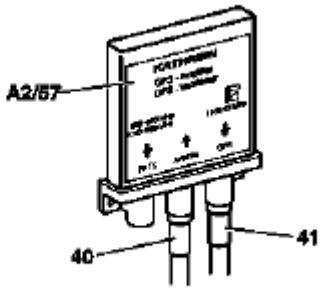
- Decoupling the **GPS** receiver from the transmitter of the **GSM** cellular telephone:

  The transmission signals of the cellular telephone must not reach the **GPS** receiver. They are passed through by the **CTEL and GPS antenna splitter (A2/57)** only in the direction of the roof antenna.

ANTENNA SPLITTER, LOCATION/PURPOSE/DESIGN/FUNCTION - GF82.85-P-3107B

MODEL 163 with CODE (353) Audio 30 APS

A2/57	*CTEL and GPS antenna splitter*
40	*Connection for coaxial cable from CTEL and GPS roof antenna (A2/49)*
41	*Connection for coaxial cable to GPS receiver*



P82.81-2304-01

Fig. 95: Identifying CTEL And GPS Antenna Splitter Design

It is possible to connect a GSM telephone to the connector not specified using coaxial cable.

	CTEL and GPS antenna splitter, location		**GF82.85-P-3107-01B**
	CTEL and GPS antenna splitter, purpose	The CTEL and GPS antenna splitter (A2/57) is required for operating a GSM telephone and a GPS receiver with one single antenna cable.	
	CTEL and GPS antenna splitter, design		**GF82.85-P-3107-03B**
	CTEL and GPS antenna splitter, function		**GF82.85-P-3107-04B**

ANTENNA SPLITTER, LOCATION/PURPOSE/DESIGN/FUNCTION - GF82.85-P-3107GH

MODEL 163 up to 31.8.01

Location of component

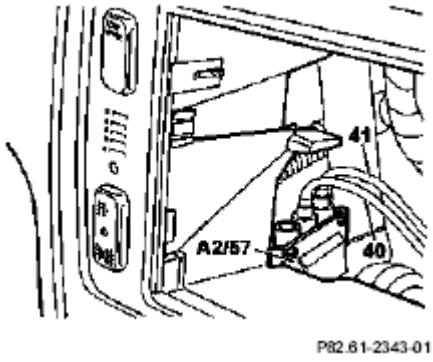


Fig. 96: Identifying Antenna Splitter Components Location

	CTEL/GPS antenna splitter, location	The **CTEL and GPS antenna splitter (A2/57)** is located in the center console on the left-hand side in the radio slot.	
	CTEL/GPS antenna splitter, purpose	The **CTEL and GPS antenna splitter (A2/57)** is required for operating a GSM cellular telephone and a GPS receiver over a single antenna cable.	
	CTEL/GPS antenna splitter, design		**GF82.85-P-3107-03GH**
	CTEL/GPS antenna splitter, function		**GF82.85-P-3107-04GH**

MODULAR CONTROL SYSTEM (MCS) SURVEY OF SYSTEM COMPONENTS LOCATION/TASK/DESIGN/FUNCTION - GF82.85-P-9995GIZ

MODEL 163 as of 1.9.01 with CODE (522) Modular control system (MCS) radio USA with CODE (357) Navigation system - additional unit with CODE (818b) Single CD player - additional unit with CODE (819) 6-disk CD changer in trunk with CODE (491) U.S. version

	Radio/navigation unit location/task/design/ function		**GF82.61-P-4109GI**
	Sound amplifier location/task/design/function	with CODE (810) Sound system	**GF82.62-P-3100GH**
	Antenna splitter, location/task/design/function		**GF82.85-P-3107B**

	FM/AM antenna amplifier, location/purpose/ design/function		**GF82.62-P-4101A**
	GPS/CTEL roof antenna location/task/design/ function		**GF82.70-P-4111A**
	CD player with changer, location/purpose/ design/function	With CD changer (code 819)	**GF82.64-P-3113GI**
	Modular control system (MCS) function description contents		**GF82.85-P-0995GIZ**

OVERVIEW OF SYSTEM COMPONENTS FOR COCKPIT MANAGEMENT AND DATA SYSTEM (COMAND), LOCATION/TASK/DESIGN/FUNCTION - GF82.85-P-9997GHZ

MODEL 163

	Operating, display and control module, location/ purpose/design/function		GF82.85-P-3114GH
	CD player with changer, location/purpose/ design/function	with (Code 819) CD changer	GF82.64-P-3113GH
	Sound amplifier, location/task/design/function	with CODE (810) sound system	**GF82.62-P-3100GH**
	FM/AM antenna amplifier, location/purpose/ design/function	MODELS 163, 168, 170, 208, 210	**GF82.62-P-4101A**
	GPS/telephone roof antenna, location/task/ design/function	MODELS 163, 168, 208.3, 210	**GF82.70-P-4111A**
	Antenna splitter, location/task/design/function	Model 163	**GF82.85-P-3107B**
	Contents, function description of cockpit management and data system (COMAND)		**GF82.85-P-0997GHZ**

E-CALL BACKUP ANTENNA, LOCATION/PURPOSE - GF82.95-P-4205GH

MODEL 163 as of 1.9.01 with CODE (349) E-Call emergency call system with CODE (491) U.S. version

1 Rear bumper
A2/50 EMERGENCY-CALL backup antenna

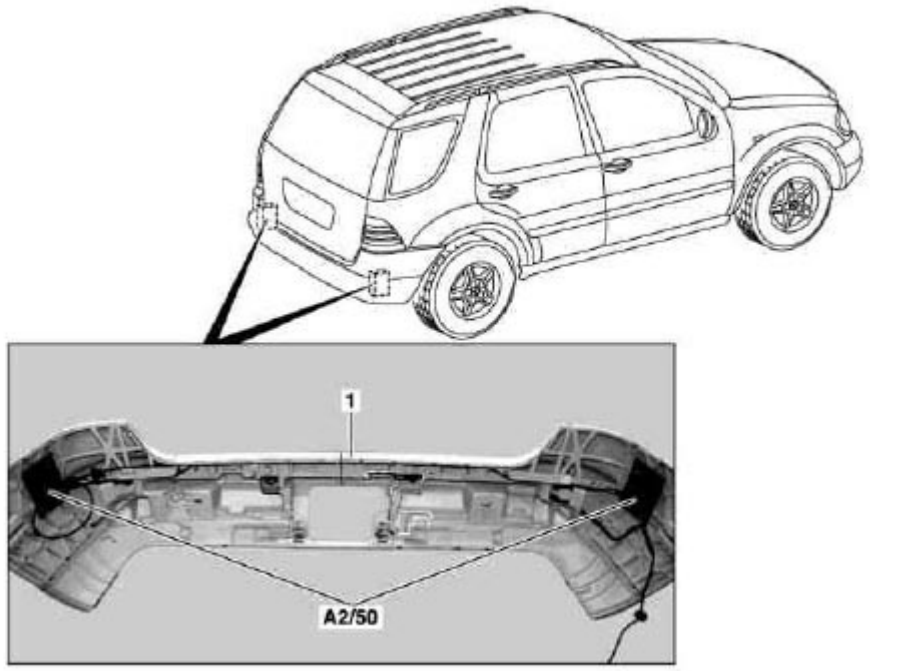


Fig. 97: Identifying E-Call Backup Antenna Location

	E-Call backup antenna, location	• The **EMERGENCY CALL backup antenna (A2/50)** is mounted on the **inside** of the rear **bumper** .	
	E-Call backup antenna, purpose	• **Transmitting** and **receiving** the **EMERGENCY CALL signals** if reception via the **CTEL and GPS roof antenna (A2/49)** is poor.	

SAFETY PRECAUTIONS

SAFETY INFORMATION: ELECTRICAL SYSTEM BODY - AS82.00-Z-9999ZZ

MODEL all

⚠ Danger!	Risk of death caused by high voltage at xenon headlamps. Risk of explosion/risk of fire caused by highly flammable materials in	MODEL all...	**AS82.10-Z-0001-01A**

	the vicinity of damaged xenon bulbs. Risk of injury caused by UV light, hot components at xenon headlamps and glass splinters produced by bursting xenon bulbs. Risk of poisoning caused by inhalation of mercury vapors and by toxic salts and mercury compounds being ingested or coming into contact with skin		
⚠ Danger!	Injury hazard from pinching and crushing, in extreme cases extremities can even be cut off when caught in windshield wiper mechanism.	MODEL all	**AS82.30-Z-0001-01A**
⚠ Danger!	The demagnetizing coil presents a lethal hazard for persons with active electronic implants (e.g. heart pacemakers).	MODEL 140...	AS82.85-Z-0001-01A

RISK OF DEATH, RISK OF EXPLOSION/RISK OF FIRE, RISK OF INJURY & RISK OF POISONING - AS82.10-Z-0001-01A

Do not come into contact with parts that are under high voltage. Persons with active electronic implants (e.g. heart pacemakers) must never work on xenon headlamps. Switch off entire lighting system. Wear insulated safety shoes, safety glasses and protective gloves. Remove highly inflammable materials from the hazard area. Ensure sufficient ventilation in the working area.

Potential risks

Risk of death

Due to the high voltages involved, contact with live components at the xenon headlamps could be life threatening!

Electric shocks can cause fibrillation of the heart or even cardiac arrest.

In addition, respiratory muscles may cramp up and result in respiratory failure.

Serious, possibly life-threatening, brain function disruptions are also possible.

It may take a few minutes for the consequences of an electrical shock to manifest themselves.

Risk of explosion/risk of fire

Highly flammable materials in the vicinity of damaged, energized xenon bulbs may result in explosion or cause fires.

Risk of injury

UV light may escape when operating xenon bulbs not properly installed in the xenon headlamps. This UV light may cause damage to the eyes (conjunctival infection) and to skin burns (sunburns) if skin is unprotected.

In both intact or faulty xenon headlamps, hot or glowing components may cause serious burn injuries if they come into contact with unprotected skin or eyes.

Glass splinters produced by the destruction of xenon bulbs may cause cut injuries in unprotected skin and unprotected eyes.

Risk of poisoning

When xenon bulbs are destroyed, serious health problems may be caused if the mercury vapors produced are inhaled or if mercury compounds or toxic salts are ingested or absorbed through the skin. Possible consequences include nausea, vomiting and gastrointestinal disruptions as well as degradation of the kidneys and the central nervous system. Skin and eye damage may also result.

Safety precautions/instructions

- Persons with electronic implants (e.g. pacemakers) must never work on xenon headlamps.
- Wear safety shoes (with rubber soles).
- Prior to working on xenon headlamps (e.g. replacing parts, hooking up test equipment, etc.), the complete lighting system must be switched off and the xenon headlamps must be disconnected from the on-board electrical system.
- If the xenon headlamps are switched on, never touch components under high voltage.
- If the xenon headlamps are switched on, maintain a clearance of at least 30 mm to components under high voltage.
- Avoid all contact with hot components.
- Wait at least 3 min after switching off xenon bulbs before touching them.
- Do not damage or destroy xenon bulbs.

Safety precautions/instructions

- Never operate xenon bulbs unless they are properly installed in xenon headlamps with UV-absorbing headlamp lenses.
- Keep all highly flammable materials away from working area.
- Wear suitable protective gloves and safety glasses.
- Ensure that the workplace is sufficiently ventilated.

First aid measures

Electrical shock

- Switch off current, bring injured person to safety.
- Immediately notify an emergency physician.
- Perform mouth to mouth respiration, if necessary.
- Perform cardiopulmonary resuscitation, if necessary.

Burn injuries

- Cool affected skin area with cold water.
- Cover burn wounds with sterile dressing.
- Consult a physician.

Cut injuries/skin injuries

- Stop the bleeding.
- Dress cut/skin injury.
- Consult a physician.

Foreign object in eye

- Cover affected eye with a sterile dressing.
- Cover both eyes to calm them.
- Consult an eye doctor immediately.

Eye contact with mercury vapors/toxic salts

- Flush eyes with lukewarm water.
- Cover eye with sterile dressing.
- Consult an eye doctor immediately.

Eye contact with UV light

- Consult an eye doctor immediately.

Poisoning caused by inhaling mercury vapors

- Take victim to fresh air.
- Consult a physician immediately.

Poisoning caused by ingesting toxic salts or mercury compounds

- Consult a physician immediately.

Always consult a medical service or physician after administering first aid.

INJURY HAZARD FROM PINCHING AND CRUSHING, IN EXTREME CASES EXTREMITIES CAN EVEN BE CUT OFF WHEN CAUGHT IN WINDSHIELD WIPER MECHANISM. - AS82.30-Z-0001-01A

Always remove ignition key before working on windshield wiper mechanism.

Injury hazard

When working in the area of the windshield wiper mechanism with the ignition key in position "1" or "2" the wiper arm or wiper linkage can be pushed out of its end position and start running **unintentionally** . This can result in severe injuries by cutting, pinching or crushing body parts.

Rules of behavior/protective measures

- Always remove ignition key before working on windshield wiper mechanism.
- Secure operating range of mechanism against reaching in.
- Keep sufficient distance away from moving parts.
- Supervise hazard area.
- Wear tight fitting clothing and hair net.

TROUBLE DIAGNOSIS

HIGH BEAMS AND/OR LOW BEAMS DO NOT WORK - AF82.10-P-2009B

MODEL 129,140,163,170, 202, 208, 210, 215, 220 with CODE (612) Xenon headlamp unit

Modification notes

4.4.00	Supersedes STIP 82.10-019 from 24.03.2000		

Damage code	Cause	Remedy	
⚠ Danger!	**Risk of death** caused by high voltage levels present at xenon headlamps. **Risk of explosion/risk of fire** caused by highly inflammable substances at damaged xenon bulbs **Risk of injury** caused by UV light, hot components at xenon	Do not come into contact with parts that are under high voltage. Persons with **active electronic implants** (e.g. heart pacemakers) must never work on xenon headlamps. Switch off the complete lighting system. Wear insulated safety shoes, safety glasses and protective gloves. Remove highly inflammable materials from the hazard area.	**AS82.10-Z-0001-01A**

	headlamps and glass splinters from broken xenon bulbs **Risk of poisoning** caused by inhaling mercury vapor and by swallowing/skin contact with toxic salts and mercury compounds	Ensure that the working area is sufficiently ventilated.	
82 119		[i] We receive at the diagnostic centers of the plants more and more xenon control units and xenon lamps which are o.k. To avoid this high number of problem parts with no reproducible faults, we would ask you to use the following procedure for troubleshooting:	
		1 Perform diagnosis according to instructions in WIS. Model 202, 208, 210	AD82.10-P-1001AZ
		[i] If the fault cannot be recognized or the faulty component determined: ? 2 Interchange the xenon lamps (right to left). (!) For the time being do not replace system components.	
		[i] If the fault of the xenon lamp still exists: ? 3 Remove/install/replace xenon lamp.	
		[i] If the fault remains in the headlamp the cause may be the xenon control unit or a fault on the vehicle side.	
		[i] We are aware of the fact that this procedure may possibly lead to another stay in the workshop of the vehicle in question. However, we see no other alternative if the redebiting of warranty and goodwill costs is to be avoided.	

MODEL 163.113/136/154/172 With 5 L reservoir

Damage code	Cause	Remedy	
	Stress fracture in windshield washer water reservoir.	1 Replace windshield washer water reservoir with large capacity reservoir.	**SM82.35-P-0002GH**

INSTALLING SOUND SYSTEM JUMPER HARNESS - AF82.60-P-1010-01AG

1. Insert sound system jumper harness through radio opening

   i Position jumper harness within cockpit assembly so that jumper harness is routed above HVAC venturi tube and lays across base of steering column.

2. Plug male radio harness connector A/B (1) into corresponding female connector (2) of jumper harness
3. Secure connectors, phone antenna and phone power lead with cable tie (3) next to radio harness mounting clip on HVAC case

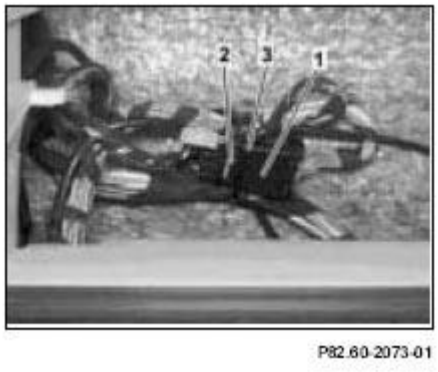
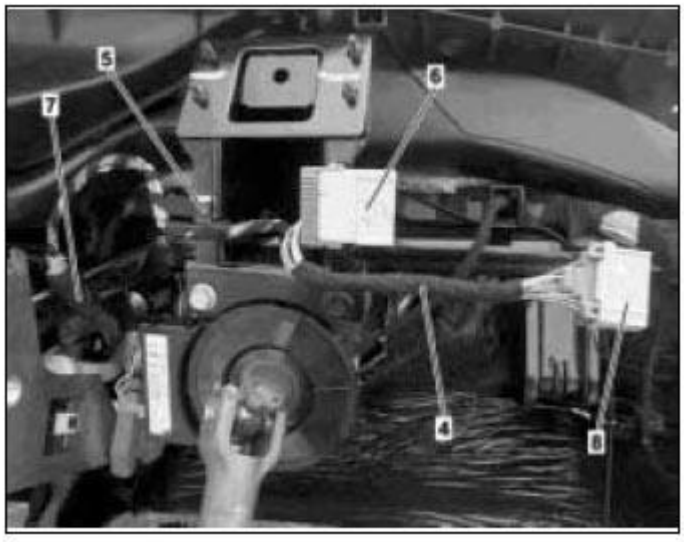


Fig. 98: Identifying Phone Power Lead With Cable Tie, Male Radio Connector And Corresponding Female Connector

4. Attach jumper harness (4) to steering column mounting bracket with integrated harness clip (5) and clip on female amplifier connector (6) of jumper harness
5. Secure jumper harness (4) to dash support bracket with cable tie (7)

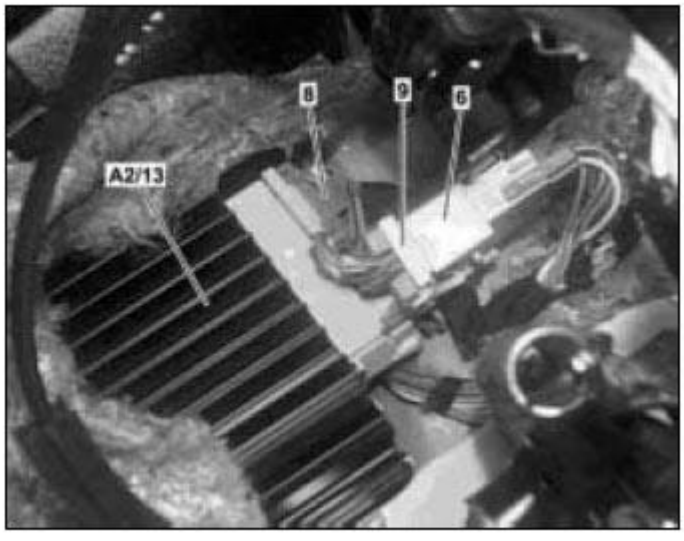
   i Install cable tie on convolute tubing protected area of jumper harness.



P82.60-2074-11

Fig. 99: Identifying Female Amplifier Connector, Cable Tie And Harness Clip

6. Cut slot in insulation to access sound system amplifier (A2/13) electrical connectors.
7. Disconnect male connector A/B (9) on sound system amplifier and plug into female amplifier connector (6) of jumper harness
8. Plug male connector A/B (8) of jumper harness into corresponding connection on sound system amplifier
9. Refit insulation



P82.60-2075-11

Fig. 100: Identifying Sound System Amplifier, Plug Male Connector A/B And Integrated Harness Clip

MODEL 163 with CODE (259) Radio Premium with Bose sound system

Damage code	Cause	Remedy	
	Speaker wires picking up interference noise from surrounding wiring	1 Remove radio	**AR82.60-P-7502EA**
		2 Remove upper center console storage compartment	
		3 Remove lower dash panel below steering column	**AR68.10-P-1500GH**
		4 Install sound system jumper harness	**AF82.60-P-1010-01AG**
		5 Reinstall in opposite order	

Parts ordering notes

Part no.	Designation	Quantity
163 540 98 05	Jumper harness for Bose sound system	1

PROGRAM CHANGE ALTHOUGH RDS [RADIO DATA SYSTEM] AND REGIONALIZATION ARE SWITCHED ON - AF82.60-P-1062A

MODEL 129, 140, 163, 168, 170, 171, 202, 203, 208, 209, 210, 211, 215, 220, 230, 463 with RDS radio

Damage code	Cause	Remedy	
	Station change without obvious cause. i Some radio stations which had originally transmitted regional identification have been transmitting the RDS signals without regional identification for some time. Without regional identification it is no longer possible to separate stations with the same station name which transmit different programs.	1 Point out the facts to the customer. i Do not replace any devices, state of the art engineering.	

INTERMITTENT INTERRUPTIONS OF RADIO RECEPTION IN RDS MODE - AF82.60-P-1101A

MODELS 163,168,170, 208, 210 with CODE (756a) MB radio Audio 10 RDS with CD compartment

Damage code	Cause	Remedy	
	Under unfavorable reception conditions in FM-RDS mode, the radio may frequently switch to alternative frequencies of one and the same radio station.	i Due to the equipment and antenna design there is no remedy available. During switchover, reception may be interrupted for a brief period.	 Do not replace any radios subject to this complaint only!

PROBLEM WITH RADIO RECEPTION AFTER INSTALLING SUN SHIELD FILM - AF82.60-P-1105A

MODEL 163, 202, 203, 208, 209, 210, 211, 215, 220

Modification notes

11.2.00	Supersedes STIP 82.60-030 dated 10.2.00		

Damage code	Cause	Remedy	
	Complaint is caused by retrofitting metallized window foils.	**When installing window foils, cut foil outside of vehicle to avoid damaging the antennas and heating wires**	
	i Metallized foil: o AM reception reduced approx. 70 %, among other problems search stop no longer possible o FM reception reduced approx. 10 % . o TV reception reduced approx. 10	i Do not use metallized foil. Advise customer of negative effects to reception	

	%. ○ Range of radio remote control for central locking reduced by up 50 % i Non-metallized foil: ○ Only slight reduction of functions described above.		

AM RADIO RECEPTION DIFFICULTIES - AF82.60-P-6005A

MODEL 163.136 /154 /172 ## up to 146760

Revisions

01.09.99	Supersedes STI no. 82.60-024 dated 01.09.99		

	Cause	Remedy	
	Loss of noise filtering function of the antenna splitter (A2/5) and the AM/FM amplifier (A2/18) due to poor ground connection.	1 Remove AM/FM amplifier	**AR82.62-P-8347GH**
	i AM radio reception is being adversely affected by background noise and electrical interference, resulting in the station signal being overridden.	2 Remove antenna splitter	**AR82.70-P-8953GH**
	The painted surface of the vehicle's body, combined with the protective coating on the mounting screws, may not provide an adequate ground.	3 Remove paint/E-coating from vehicle body at mounting points of antenna splitter and AM/FM amplifier 4 Remove protective coating on shoulder of antenna splitter and amplifier mounting screws	

		5 Reinstall antenna splitter 6 Reinstall AM/FM amplifier	**AR82.70-P-8953GH** **AR82.62-P-8347GH**

CDS AND DVDS ARE NOT EJECTED - AF82.60-P-6061A

MODEL 129, 140, 163, 168, 170, 171, 202, 203, 208, 209, 210, 211, 215, 220, 230, 414, 463

Modification notes

17.5.04	Cause/remedy 3 added		

Damage code	Cause	Remedy	
		i **The causes listed in this document are not a malfunction of the CD drive. Operations in this context are not covered by warranty or goodwill** .	
	Cause 1:	**Remedy 1:**	
	CD thickness is not within tolerance, e.g. DVDs with recordings on both sides (side 1: video data, side 2 audio data). i CD occasionally not pulled in, light pressure required in addition. Then, CD is not ejected. i CD does not satisfy specifications. According to CD standards, the thickness must be within the tolerance range of 1.1 mm -1.5 mm. Previously measured CDs had a thickness of > or = 1.6 mm.	1 Inform customer that CDs should correspond to specifications. i Drives fulfill specifications.	
None	**Cause 2:**	**Remedy 2:**	
	Self-made CDs/DVDs used with self-adhesive labels. i Due to the various materials used, the length expansion differs at higher	1 Advise customers not to use CDs/DVDs with self-adhesive labels. i Please also advise your coworkers in Sales.	

	temperatures causing the label to become wavy (see arrows) or the CD/DVD to deform. In both cases, the CDs/DVDs can get stuck and damage to the drive mechanism is possible. ○ CDs/DVDs are not ejected. ○ CDs/DVDs are not completely ejected. All head units with CD/DVD drive, all CD changers as well as navigation processors with single-slot drive are affected.		
None	**Cause 3:**	**Remedy 3:**	
	CDs with a diameter of 8 cm are used (with and without adapter). i The pull in/eject mechanism of the drive is Drives not designed for 8 cm CDs. i If an adapter is used for 8 cm CDs, the thickness of the CD increases which leads to problems when inserting and ejecting CDs. Furthermore, there is the danger that the 8 cm CD will be pushed out of the adapter while being pulled in/ejected and thereby block the mechanism.	1 Please inform the customer that 8 cm CDs are not to be used (even with an adapter). i Drives fulfill specifications.	

Arrow Waves on the CD label

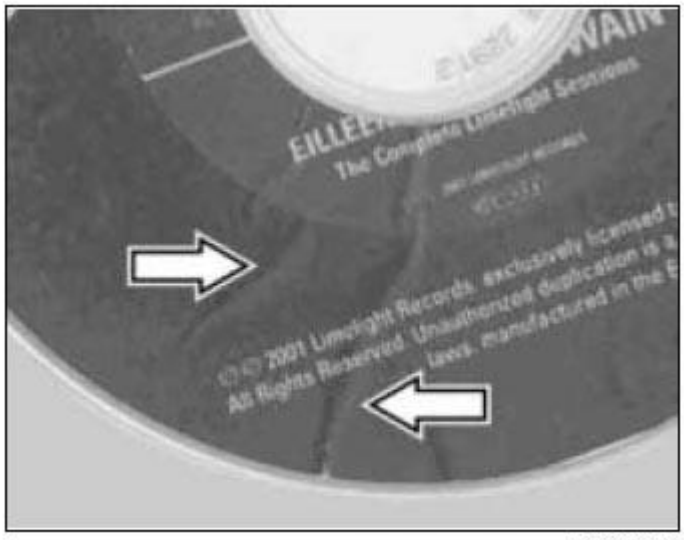


Fig. 101: Identifying Waves On CD Label

GLOBAL POSITIONING SYSTEM (GPS) MALFUNCTION - AF82.61-P-6010A

MODEL 163.113 /136 /154 /172 /174 #A as of 145273 up to 289564, 163.113 /154 #X as of 708319 up to 754619 with CODE (353) Audio 30 APS

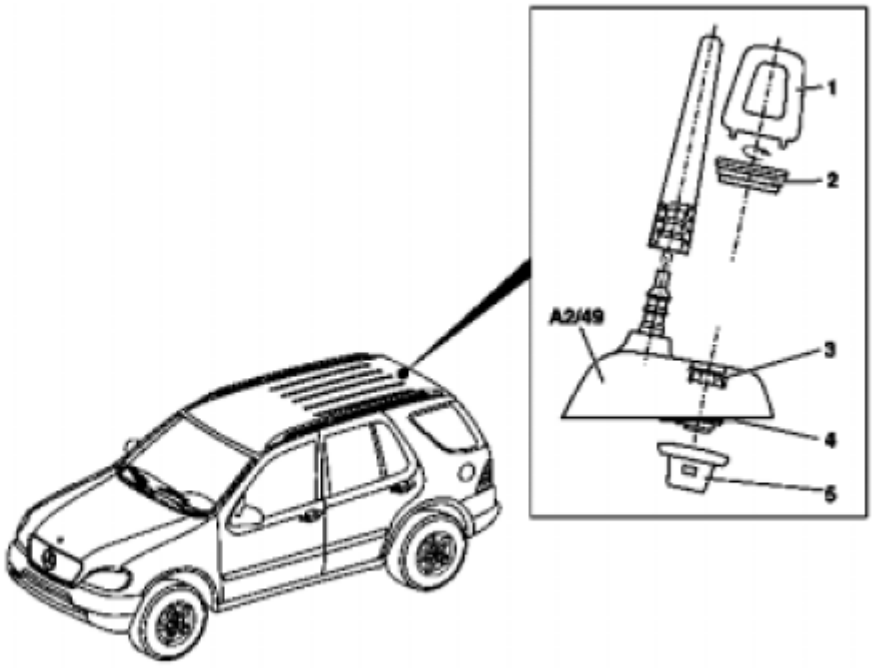
Operation no. of operation texts or standard texts and flat rates

Sector	Op. no.	Operation text	Time	Acc. no.	Code
P	023578	REPLACE REAR ANTENNA FOR GLOBAL POSITIONING SYSTEM (GPS) (AFTER TESTING)	003 AW/0,3 h	82 858 52	-

Damage code	Cause	Remedy	
	Inadequate seal between antenna base and vehicle roof causes antenna connector to corrode. i The parts kit for the Global Positioning System (GPS) antenna was updated. Instead of a foam seal (4), a grommet (5) is now used to seal the antenna base to the vehicle roof. The new **163 820 18 75** part	1 Replace GPS antenna. i Use new parts kit only.	**AR82.61-P-7474GI**

	number replaces the former **163 820 06 75** part number.		

1 *Special wrench*
2 *Cover*
3 *Threaded sleeve*
4 *Foam seal*
5 *Grommet*
A2/49 *CTEL and GPS roof antenna*



P82.61-2534-06

Fig. 102: Identifying GPS Rear Antenna Components

Parts ordering notes

Part no.	Designation	Quantity
163 820 18 75	Antenna	1

TELEPHONE CALL INTERRUPTED - AF82.70-P-1009A

MODEL 129, 163, 168, 170, 171, 202, 203, 208, 209, 210, 211, 215, 220, 230, 460, 461, 463 with CODE (312) GSM portable cellular telephone with CODE (316) MB GSM cellular telephone (D2B) with CODE (317) GSM portable cellular telephone (D2B) with CODE (347) TELE AID emergency call system (D2B) with CODE (380) Preinstallation for MB phone "CTEL", complete with CODE (381) MB phone "Standard" in console on right side of dome with CODE (382) MB phone "CTEL" in console on right side of dome with CODE (383) With telephone "Standard" in console on right side of dome with integrated TELEAID emergency call system, hands-free system and antenna with CODE (386) Preinstallation for "portable CTEL" UPCI telephone system with CODE (388) "Portable CTEL" UPCI telephone system with CODE (852) CTEL preinstallation assembly at dome with CODE (853) MB standard cellular telephone with CODE (854) MB portable cellular telephone with CODE (855) TELE AID

Damage code	Cause	Remedy	

	Network is overloaded i The telephone system has been checked technically	i Do not remove/install/replace any parts. It is not necessary to replace the telephone control module due to call interruptions. 1 Ask network provider about traffic at point in question. i If the customer uses a twin card it is necessary to switch off the additionally (externally) operated cellular telephone before the vehicle's telephone system is switched on.	

LOSS OF SOUND IN COMAND SYSTEM AND/OR TELEPHONE NOT FUNCTIONING - AF82.70-P-1090A

MODEL 163, 203, 208, 209, 210, 215, 220, 230, 463 with CODE (853) MB standard cellular telephone

Nokia 6091

Damage code	Cause	Remedy	
	Fixed installation telephone control unit. i Cyclical loss of sound in COMAND system for 2 - 3 seconds (Nokia 6091). Telephone temporarily not functioning.	1 Read out series number. i via the receiver using the key combination: *#06# The series number can also be found on the sticker on the control unit.	
	i Concerns fixed installation control unit part no. A 203 820 70 26. When reading out with STAR DIAGNOSIS (quick test) part no. 000 000 00 00 appears with these control units. Affected Nokia series numbers: from 350109/20/038841/6 up to 350109/20/047721/9	i If the affected series number is installed: ? 2 Remove/install/replace fixed installation telephone control unit.	

Parts ordering notes

Part no.	Designation	Quantity
A 203 820 70 26	Fixed installation telephone control unit	As required

PORTABLE CTEL CANNOT BE OPERATED OVER STEERING WHEEL OR COMAND/RADIO - AF82.70-P-6090A

MODEL 129, 163, 168, 170, 202, 203, 208, 210, 211, 215, 220 with CODE (380) Preinstallation for MB phone "CTEL", complete with CODE (382) MB phone "CTEL" in console on right side of dome with CODE (852) CTEL preinstallation assembly at dome with CODE (854) MB portable cellular telephone with Nokia 6210

Modification notes

12.3.02	Supersedes STIP 82.70-035 dated 14.08.2001	Validity and content updated	

Damage code	Cause	Remedy	
	Nokia 6210 cannot be operated with current interface	i Operation of Nokia 6210 possible with new interface. Modified interface available. Nokia 6210 portable CTEL software version 4.36 or higher required For model 211 the portable CTEL SW version 5.2 is required.	
		1 Read out Nokia 6210 portable CTEL software version	
		2 Enter *#0000# on Nokia 6210 portable CTEL.	
		i If an older version is installed the portable CTEL must be updated in a Nokia shop. If the customer has stored data in the portable CTEL telephone, it is necessary to secure this in the Nokia shop before updating.	
		3 Remove and install, replace interface.	
		MODEL 203.0 with CODE (854) MB portable CTEL	AR82.70-P-7379EE
		MODEL 215, 220 up to 30.6.00 with CODE (317) D-network portable CTEL (D2B)	AR82.70-P-8920I
		MODEL 210.0 as of	AR82.70-P-7379FB

		1.7.00 with CODE (854) MB portable CTEL	
		MODEL 208.3 as of 1.7.00 with CODE (854) MB portable CTEL	AR82.70-P-7379EA
		[i] Insert interference suppression converter between compensator (A28/3) outlet in direction of portable CTEL holder. [i] Installation location for compensator: ?	
		MODEL 203.0 with CODE (854) MB portable CTEL	AR82.70-P-0010A
		MODEL 208.3 as of 1.7.00 with CODE (854) MB portable CTEL	AR82.70-P-0010AC
		MODEL 210.0 with CODE (854) MB portable CTEL	AR82.70-P-0010B
		MODEL 210.2 with CODE (854) MB portable CTEL	AR82.70-P-0010C
		MODEL 215 as of 1.7.00 with CODE (854) MB portable CTEL	AR82.70-P-0010AD
		MODEL 220 as of 1.7.00 with CODE (854) MB portable CTEL	AR82.70-P-0010AE
		[i] Return removed interface (203 820 32 26) with index ES1 0070 to appropriate ELCs with return slip. To ensure supply of replacement parts we request you to send in the removed interface immediately.	

Parts ordering notes

Part no.	Designation	Quantity
203 820 51 85	Interface	As required

203 820 07 51	Clip for portable CTEL mount	As required
203 820 52 15	Interference suppression converter	As required

COMAND OPERATING AND DISPLAY SYSTEM SCREEN REMAINS DARK AFTER STARTING ENGINE - AF82.85-P-2001A

MODEL 163, 203, 208, 210, 215, 220, 230, 463 with CODE (352) COMAND operating and display system

Damage code	Cause	Remedy	
	Current vehicle voltage.	i Do not remove/install COMAND. 1. Point out to customer that in the event of problems the fault can be eliminated by switching off/on (ON/OFF button) the COMAND.	

NAVIGATION SYSTEM DISPLAYS INCORRECT ADDRESS - AF82.85-P-2100A

MODEL 163.154 /174 #A as of 289565, 163.157/175 with CODE (357) Navigation system - additional unit with CODE (494a) USA version

Mainland USA only,

DVD version 2002-2 only

Operation no. of the operation texts or standard texts and flat rates

Range	Op. no.	Operation text	Flat rate	Acc. no.	Code
P	023917	Flash Navigation system	0.3 h	82 853 90	-

Damage code	Cause	Remedy	
	Database mismatch.	1 Start engine.	
		2 Turn on MCS unit.	
		3 Press NAVI MENU button.	
		4 Ensure MAP REGION is set to MAINLAND US under SYSTEM SETUP menu.	
		5 Eject customer Navigation DVD.	

		6 Insert update CD into Navigation unit and close MCS door.	
		7 Follow on-screen instructions until update is complete. (!) DO NOT turn off engine.	
		8 Remove update CD when download is complete. i Disregard error message stating disc cannot be read: There is no map information on the update CD.	
		9 Insert customer Navigation DVD and input any new address to verify accuracy.	

Parts ordering notes

Part no.	Designation	Quantity
T-2787-163	Navigation update CD	1

ERROR IN COMAND OPERATING AND DISPLAY SYSTEM - AF82.85-P-6000-01B

i Error patterns for COMAND update CD 10/2001.

The service update CD COMAND with part number W 215 589 00 22 00 eliminates the following complaints:

- COMAND: A 220 820 37 89

Error patterns:

- Increased quiescent current.
- The personal symbols on the map are not updated during active guidance.
- Voice control does not react to commands
- Occasionally no sound (duration approx. 1 second).

- COMAND: A 203 820 91 89, A 463 820 10 89

Error patterns:

- Increased quiescent current.

- The personal symbols on the map are not updated during active guidance.
- Voice control does not react to commands
- Occasionally no sound (duration approx. 1 second).
- TV screen switches off when standing still
- After switching on CD player plays CD1/track 1 instead of title played last
- No message when CD magazine sticks during ejection
- Wavy interference in navigation display when TV picture is switched off (as if station is not correctly received)
- TCS icons are occasionally not displayed on the map with active dynamic guidance
- Telephone book is not activated.

- COMAND: A 208 820 40 89, A 210 820 54 89, A 163 820 14 89

Error patterns:

- Increased quiescent current.
- The personal symbols on the map are not updated during active guidance.
- Voice control does not react to commands
- No message when CD magazine sticks during ejection
- TCS cannot be activated sporadically.
- Time in instrument cluster and COMAND differs approx. 1-2 seconds.
- COMAND signals CD reading error without any obvious cause

PERFORMING SOFTWARE DOWNLOAD - AF82.85-P-6000-04A

COMAND 2.0-ECE / 2.5-ECE - Perform software download of CD:

Do not start vehicle during download, do not cause other voltage drops in the vehicle electrical system, do not remove CD and do not switch off unit! (Unit will be damaged!)

In the case of erroneous operation of the download control module, the download starts again or is terminated if the old software has not been erased previously.

1. Switch off ignition.
2. Remove navigation CD and insert download CD.
3. Switch off control module.
4. After a waiting time of min. 5 s and with buttons * and # pressed simultaneously, switch on unit.

   The menu "Service download of CD" appears with menu points "Control module" and "Termination".

5. Select "Start control module" with right knob

i The date or the version of the currently stored software and the software on the CD appears in the display.

i By pressing the right knob the download is started. After some seconds the system changes to screen "CD ROM software download".

- On the download control module the main processor software is loaded first, then the graphic processor software. Entire duration: approx. 40 minutes
- The download progress is indicated by a bar graph.

i In the event of errors an error message is indicated on the display.

When the download is completed, the display switches off for a short time. When it is switched back on again the result of the download is displayed.

6. Remove download CD and reinsert navigation CD.

FAULT IN COMAND OPERATING AND DISPLAY SYSTEM - AF82.85-P-6000N

MODEL 163, 203, 208, 210, 215, 220, 463 with CODE (352a) COMAND operating and display system with CODE (801) Model year 2001

MODEL 414 with CODE (EN4) Auto pilot system with TMC interface, large display with CODE (EN3) Auto pilot system with GSM interface, large display

Modification notes

26.11.01	Supersedes **AF82.85-P-6000N** dated 09.01.2002	Part numbers added and changed	**AF82.85-P-6000-01B**

Operation no. of operation texts or standard texts and flat rates

Category	Op. no.	Operation text	Time	Acc. no.	Code
P	829905	PERFORMING SW UPDATE FOR RADIO/COMAND	003 WU/0.3 h	-	-

Damage code	Cause	Remedy	
	Software error	i Error patterns for COMAND update CD 10/2001. 1 Perform COMAND update Update only COMAND with the following part numbers. A 163 820 14 89	**AF82.85-P-6000-01B** **AF82.85-P-6000-04A**

		A 203 820 91 89 A 208 820 40 89 A 210 820 54 89 A 220 820 37 89 A 463 820 10 89 i CD covers exist with incorrect part number for model series 203. **Do not update part number** **A 203 820 96 89.** i The CD should remain in the workshop (service CD) It can be used several times and should not be given to customers! Always order service CD in advance to avoid longer workshop visits!	

Parts ordering notes

Part no.	Designation	Quantity
W 215 589 00 22 00	COMAND service update CD	1

AUDIO SYSTEM FAILS TO MUTE WHEN INCOMING PHONE CALLS RECEIVED - AF82.85-P-6010A

MODEL 163.113 /154 /172 /174 #A as of 221506 up to 289564, 163.113 #X as of 734088 up to 754619 with CODE (352a) COMAND operating and display system with CODE (353) Audio 30 APS with CODE (756b) MB Audio 10 CD radio with TP/RDS with CODE (819a) CD changer with CODE (854) MB portable cellular telephone

Modification notes

17.9.01	Supersedes STI no. 82.85-024 dated 14.9.01		

Damage code	Cause	Remedy	
	Software error in CD changer. i On vehicles equipped with Code 352a, 756b or 353 in combination with Code 819a and 854 the audio system may sporadically fail to auto-mute when incoming	1 Inspect CD changer part number i If equipped with part number: **163 820 15 89** , then ?	

	phone calls are received.		
		2 Replace CD changer i See parts ordering notes.	**AR82.64-P-7507GH**

Parts ordering notes

Part no.	Designation	Quantity
163 820 38 89	CD changer	1

NAVIGATION SYSTEM ERRONEOUS OR NO GUIDANCE - AF82.85-P-6061A

MODEL 163, 168, 170, 203, 208, 209, 210, 211, 215, 220, 230, 414, 463

Damage code	Cause	Remedy	
	Defective digitization of map material Possible switch-off or falsification of GPS signals during worldwide crisis	1 Perform test drive with other vehicle i This must be compared with the same navigation system and the same version of navigation CD.	
	i The satellite signal includes the time at which the signal was sent The navigation processor Calculate the transmission time of the signal resulting from the satellite position and the transmission time of the GPS signal and can therefore determine the vehicle position (min. 3 satellites). If the GPS signal is falsified the transmitted time from the satellites is changed. A change of 10 ns corresponds to approx. 3 m position change	i If the complaint is still present: ? 2 Perform test drive with new navigation CD version. i When the complaint is eliminated, use new navigation CD.	
		i If the complaint is still present: ? 3 Perform test drive with other vehicle and navigation system of	

		other manufacturer.	
		i If the complaint does not occur during the test drive, a digitization error on the navigation CD is present: ? 4 Inform customers of facts and manufacturer of CD with report form i If the correct report form from the manufacturer is not available, please contact corresponding service center (telephone number is given on label of navigation CD):	
		5 Check antenna system for proper function and repair according to condition.	
		i If the antenna system is okay and errors also occur on other vehicles: ? 6 Inform customer that the GPS system is operated by the US military	

MCS MALFUNCTION - OCCASIONAL FAILURE OF STARGUIDE, SOUND OR CD CHANGER. DTC'S N1111, N1112, N1116 - AF82.95-P-6002A

MODEL 163.157 /174 /175 #A as of 409851 up to 419036 with CODE (349) E Call emergency call system with CODE (522) Modular control system (MCS) radio USA

Operation no. of operation texts or standard texts and flat rates

Range	Op. no.	Operation text	Time	Acc. no.	Code
P	023843	FLASH TELEAID EMERGENCY CALL SYSTEM CONTROL MODULE	008 WU/0.7 h	82 876 90	-

Damage code	Cause	Remedy	
	Data transmission of D2B ring is interrupted. The E-call control module is in a	Recode E-call control module: ?	

	bypass mode. i The E-call control module is not recognized by the D2B ring. The emergency call function is not affected, this function is INDEPENDENT of the D2B ring.	1 Connect STAR-DIAGNOSIS.	
		2 Select "Information and communication" in the "Control module" menu	
		3 Select "TELE AID, E-call or telephone - telematic system (K-line)".	
		4 Select "Control module version".	
		5 Check "Software version". i If the "software version" has the status of **04/03** , NO FURTHER STEPS ARE REQUIRED. If "Software version" has the status of **02/02** ? 6 Select "Program control module according to factory data" in "TELE AID" menu.	
		7 Follow instructions until procedure is completed. i Complete DAS and remove before SOS button is pressed.	
		8 Connect STAR-DIAGNOSIS.	
		9 Perform short test and erase all DTC's. i DTC's are stored in MCS and E-call control module.	
		10 Select "Control module version" and "Software version" in "TELE AID"	

		menu and ensure that software status **04/03** is available.	
		11 Complete DAS and finish STAR-DIAGNOSIS.	

SELF-DIAGNOSTIC SYSTEM

INTERIOR LIGHTS DIAGNOSIS CONTENTS - AD82.20-P-1000GHZ

MODEL 163

A2.20 [] 11b	Interior lighting diagnosis, previous knowledge		**AD82.20-P-2000GH**
A2.2 [] 12b	Interior lighting diagnosis, function check		**AD82.20-P-3000GH**
A2.2 [] 14b	Interior lighting diagnosis, troubleshooting		**AD82.20-P-5000GH**
A2.2 [] 21b	Interior lighting diagnosis, testing electrical system		**AD82.20-P-6000GH**

INTERIOR LIGHTS DIAGNOSIS PREVIOUS KNOWLEDGE - AD82.20-P-2000GH

MODEL 163

GF	Function description, interior lighting		**GF82.20-P-0002GH**
GF	Location of components, interior lighting		**GF82.20-P-0002-01GH**
PE	Electric wiring diagram, interior lighting		PE82.20-P-2000G
PE	Inter-function groups of wiring diagrams		PE00.19-P-1100E
	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Diagnostic tools, interior lighting		**AD54.21-P-2000-01GH**
	Assignment of coupling on door separation points		**AD72.29-P-2000-03GH**

INTERIOR LIGHTS DIAGNOSIS OPERATIONAL CHECK - AD82.20-P-3000GH

MODEL 163

	Location of components, interior lighting		**GF82.20-P-0002-01GH**
	Interior lighting diagnosis, previous knowledge		**AD82.20-P-2000GH**
I	Battery voltage 11-14 V		
II	Fuses in order		
III	AMM voltage supply in order		**AD54.21-P-6000-01GH**
IV	Lighting equipment in order		
	Function check		
Scope of test	**Operation/Requirement**	**Specified value**	**Possible cause/ Remedy**
1 Switch on front interior lighting manually	All doors closed, operate switch on front dome lamp (with shut-off delay and front reading lamp)(E15/2).	Front dome lamp (with shut-off delay and front reading lamp) (E15/2) illuminated	Cables E15/2
2 Switch on right rear interior lighting manually	All doors closed, operate switch on right rear dome lamp (E15/9).	Right rear dome lamp (E15/9) illuminated	Cables E15/9
3 Switch on left rear interior lighting manually	All doors closed, operate switch on left rear dome lamp (E15/8).	Left rear dome lamp (E15/8) illuminated	Cables E15/8
4 Switch on interior lighting by opening a front door	All doors closed, all interior lamps OFF, open left front or right front door.	Front dome lamp (with shut-off delay and front reading lamp) (E15/2), left rear dome lamp (E15/8) and right rear dome lamp (E15/9) dimmed	Rotary tumbler microswitch **AD80.20-P-6001-39GH** Interior lamps **AD82.20-P-5000GH** Cables All-Activity Module (AAM) (N10)
5 Switch on interior lighting by opening a rear door	All doors closed, all interior lamps OFF, open left rear or right rear door.	Left rear dome lamp (E15/8) and right rear dome lamp (E15/9) dimmed	Rotary tumbler microswitch **AD80.20-P-6001-40GH** Interior lamps **AD82.20-P-5000GH** Cables All-Activity Module (AAM) (N10)
6 Switch on interior lighting by unlocking	Central locking in order All doors closed and locked, all interior lamps	Front dome lamp (with shut-off delay	All-Activity Module (AAM) (N10)

vehicle	OFF, unlock vehicle with transmitter key.	and front reading lamp) (E15/2), left rear dome lamp (E15/8) and right rear dome lamp (E15/9) dimmed	
7 Switch on interior lighting by switching off ignition	All doors closed, all interior lamps OFF, ignition OFF.	Front dome lamp (with shut-off delay and front reading lamp) (E15/2), left rear dome lamp (E15/8) and right rear dome lamp (E15/9) dimmed	All-Activity Module (AAM) (N10)
8 Switch off interior lighting by switching on ignition	All doors closed, interior lighting switched on by opening a front door, ignition ON.	Front dome lamp (with shut-off delay and front reading lamp) (E15/2), left rear dome lamp (E15/8) and right rear dome lamp (E15/9) dimmed	All-Activity Module (AAM) (N10)
9 Switch on rear interior lighting manually	Switch on rear dome lamp (E15/3) in "ON continuously" position.	Rear dome lamp (E15/3) illuminated	**AD82.20-P-6000-03GH** E15/3
10 Rear interior lighting switches on automatically	Switch on rear dome lamp (E15/3) in "Automatic" position, open rear doors.	Rear dome lamp (E15/3) illuminated	**AD80.20-P-6001-40GH** **AD82.20-P-6000-03GH** E15/3

INTERIOR LIGHTS DIAGNOSIS TROUBLESHOOTING - AD82.20-P-5000GH

MODEL 163

GF	Location of components, interior lighting		**GF82.20-P-0002-01GH**
◁◑	Fuses in order		
I	Battery voltage 11-14 V		
II	AMM voltage supply in order		**AD54.21-P-6000-01GH**
III	Lighting equipment in order		
	Troubleshooting		
Complaint	**Possible cause**	**Notes**	**Remedy/Test step**
Interior lighting	Cables		Voltage supply

inoperative			Terminal 30
Interior lighting does not switch off with ignition "ON", or does not switch on with ignition "OFF"	All-Activity Module (AAM) (N10)		N10
Malfunctions **only when switched on automatically** (by opening the doors):			
None of the interior lights come on when one of the front doors is opened	Left front door rotary tumbler microswitch (S87/7) Right front rotary tumbler microswitch (S87/6) All-Activity Module (AAM) (N10)		**AD80.20-P-6001-39GH** Cables N10
Rear interior lighting does not come on when one of the rear doors is opened	Left rear door rotary tumbler microswitch (S87/2) Right rear door rotary tumbler microswitch (S87/3) All-Activity Module (AAM) (N10)		**AD80.20-P-6001-40GH** Cables N10
Front dome lamp (with shut-off delay and front reading lamp) (E15/2) does not come on when the front doors are opened.	Front dome lamp (with shut-off delay and front reading lamp) (E15/2)		**AD82.20-P-6000-01GH** E15/2
Left rear dome lamp (E15/8) does not come on when the doors are opened	Left rear dome lamp (E15/8) All-Activity Module (AAM) (N10)	If E15/9 functions: otherwise:	E15/8 **AD82.20-P-6000-02GH**
Right rear dome lamp (E15/9) does not come on when the doors are opened	Right rear dome lamp (E15/9) All-Activity Module (AAM) (N10)	If E15/8 functions: otherwise:	E15/9 **AD82.20-P-6000-02GH**
Malfunctions **of individual lamps only** (when switched on automatically and manually)			
Front dome lamp (with shut-off delay and front reading lamp) (E15/2) inoperative	Front dome lamp (with shut-off delay and front reading lamp)(E15/2)		Cables, E15/2

Left rear dome lamp (E15/8) inoperative	Left rear dome lamp (E15/8)		Cables, E15/8
Right rear dome lamp (E15/9) inoperative	Right rear dome lamp (E15/9)		Cables, E15/9
Interior lighting does not come on when central locking is unlocked		Central locking in order	Cables N10
Malfunctions of rear dome lamp (E15/3):			
Rear dome lamp (E15/3) inoperative	Rotary tumbler/trunk lid microswitch (S88/1) Rear dome lamp (E15/3)		**AD82.20-P-6000-03GH** **AD80.20-P-6001-44GH**

INTERIOR LIGHTS TEST OF ELECTRICAL SYSTEM FRONT DOME LAMP - AD82.20-P-6000-01GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Front dome lamp (with shut-off delay and front reading lamp) (E15/2)** Automatic actuation	C — E15/2 — B	Disconnect coupling on (E15/2). Actuation of interior lighting "Dome lamp ON".	11-14 V	• Cables • All-Activity Module (AAM) (N10)

Fig. 103: Interior Lights Test Of Electrical System Front Dome Lamp

INTERIOR LIGHTS TEST OF ELECTRICAL SYSTEM REAR LAMPS - AD82.20-P-6000-02GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Left rear dome lamp (E15/8)** Automatic actuation	C — E15/8 — B	Actual value Interior lighting "Rear lamps ON"	11-14 V	• Cables
1.1	**Right rear dome lamp (E15/9)** Automatic actuation	C — E15/9 — B	Actual value Interior lighting "Rear lamps ON"	11-14 V	• Cables • All-Activity Module (AAM) (N10)

Fig. 104: Interior Lights Test Of Electrical System Rear Lamps

INTERIOR LIGHTS TEST OF ELECTRICAL SYSTEM REAR DOME LAMP - AD82.20-P-6000-03GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Rear dome lamp (E15/3)** Voltage supply	A — E15/3 — B		11-14 V	• Cables
1.1	**Rear dome lamp (E15/3)** Automatic actuation	C — E15/3 — B	Tailgate closed	11-14 V	• Cables

Fig. 105: Interior Lights Test Of Electrical System Rear Dome Lamp

INTERIOR LIGHTS TEST OF ELECTRICAL SYSTEM - AD82.20-P-6000GH

MODEL 163

	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Interior lighting diagnosis, previous knowledge		**AD82.20-P-2000GH**
I	AAM voltage supply in order		**AD54.21-P-6000GH**
II	Battery voltage 11-14 V		
III	Fuses in order		
i	Lighting equipment in order		
	Testing		
1	Front dome lamp, testing electrical system of interior lighting		**AD82.20-P-6000-01GH**
2	Rear lamps, testing electrical system of interior lighting		**AD82.20-P-6000-02GH**
3	Rear dome lamp, testing electrical system of interior lighting		**AD82.20-P-6000-03GH**
4	Front doors rotary tumbler microswitch		**AD80.20-P-6001-39GH**
5	Rear doors rotary tumbler microswitch		**AD80.20-P-6001-40GH**
6	Tailgate rotary tumbler microswitch		**AD80.20-P-6001-44GH**

WIPER SYSTEM DIAGNOSIS CONTENTS - AD82.30-P-1002GHZ

MODEL 163

A2.2 [] 11a	Wiper system diagnosis, previous knowledge		**AD82.30-P-2002GH**
A2.2 [] 12a	Wiper system diagnosis, function check		**AD82.30-P-3002GH**
A2.2 [] 14a	Wiper system diagnosis, troubleshooting		**AD82.30-P-5002GH**
A2.2 [] 21a	Wiper system, testing electrical system		**AD82.30-P-6002GH**

WIPER SYSTEM DIAGNOSIS PREVIOUS KNOWLEDGE - AD82.30-P-2002GH

MODEL 163

⚠ Danger!	Risk of injury due to getting jammed or crushed in extreme cases due to limbs being severed by coming into contact with the windshield wiper mechanism	Always remove the ignition key when working on the windshield wiper mechanism.	**AS82.30-Z-0001-01A**
GF	Location of components, front screen wiper system		**GF82.30-P-0005-01GH**
GF	Location of components, rear screen wiper system		**GF82.30-P-0004-01GH**
GF	Function description, wiper system		**GF82.30-P-0003GH**
PE	Electric wiring diagram, wiper system		PE82.30-P-2000F
PE	Inter-function groups of wiring diagrams		PE00.19-P-1100E
	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Diagnostic tools, wiper system		**AD54.21-P-2000-01GH**

WIPER SYSTEM DIAGNOSIS OPERATIONAL CHECK - AD82.30-P-3002GH

MODEL 163

	Location of components, wiper system	Rear screen wiper system Front screen wiper system	&(**GF82.30-P-0004-01GH**) &(**GF82.30-P-0005-01GH**)
	Wiper system diagnosis, previous knowledge		**AD82.30-P-2002GH**
	Prerequisites for function check		
I	Battery voltage 11-14V		
II	Fuses in order		
III	AAM voltage supply in order		**AD54.21-P-6000-01GH**
IV	Ignition (terminal 15) ON		
	Function check		
Scope of test	**Operation/requirement**	**Specified value**	**Possible cause/**

			Remedy
1 Tip wiping	Combination switch (S4) in "Tip wiping" position	Wiper runs at slower speed, **while** S4 is operated	Cables **AD82.30-P-6002-09GH** **AD82.30-P-6002-02GH**
2 Front screen wiping Stage 1	Combination switch (S4) in "Wiping stage 1" position	Wiper runs at slow speed	Cables **AD82.30-P-6002-09GH** **AD82.30-P-6002-02GH**
3 Front screen wiping Stage 2	Combination switch (S4) in "Wiping stage 2" position	Wiper runs quickly	Cables **AD82.30-P-6002-09GH** **AD82.30-P-6002-02GH**
4 Front screen intermittent wiping	Combination switch (S4) in "Intermittent wiping" position.	Wiper runs, an interval of approx. 5 seconds follows each complete wiping process	Cables Intermittent wiper control **AD82.30-P-6002-01GH**
5 Front screen washing	Combination switch (S4) in "Washing" position	Windshield washer pump (M5/1) operates while S4 is actuated, the wiper carries out three more wiper processes after the switch is released	Cables **AD82.30-P-6002-10GH** **AD82.30-P-6002-04GH** **AD82.30-P-6002-02GH**
6 Rear screen intermittent wipe	Operate "Rear screen intermittent wipe" on rear window wiper/washer switch (S78).	Rear wiper runs, an interval of approx. 5 seconds follows each complete wiping process	Cables **AD82.30-P-6002-06GH** **AD82.30-P-6002-08GH**
7 Rear screen washing	Operate "Rear screen intermittent wipe" on rear window wiper/washer switch (S78).	The rear window washer pump (M5/3) operates while S78 is operated, the wiper carries on wiping for 3 seconds after the switch is released and then stops in the rest position	Cables **AD82.30-P-6002-06GH** **AD82.30-P-6002-08GH** **AD82.30-P-6002-05GH**

WIPER SYSTEM DIAGNOSIS TROUBLESHOOTING - AD82.30-P-5002GH

MODEL 163

	Location of components, wiper system	Front screen Rear screen	&(**GF82.30-P-0005-01GH**) &(**GF82.30-P-0004-01GH**)
	Battery voltage 11-14 V		
◁	Fuses in order		
	AAM voltage supply in order		**AD54.21-P-6000-01GH**
	Troubleshooting		
Complaint	**Possible cause**	**Notes**	**Remedy/Test step**
Front wiper system inoperative	Combination switch (S4) Wiper motor (M6/1)		**AD82.30-P-6002-09GH** **AD82.30-P-6002-02GH**, **cables**
Front wiper does not function when washing front screen	Wiper motor (M6/1)		**AD82.30-P-6002-02GH**
Windshield washer pump does not function when washing front screen	Windshield washer pump (M5/1)		**AD82.30-P-6002-04GH**
Front wiper does not function in wiping stage 1 or stage 2	Combination switch (S4) Wiper motor (M6/1)		**AD82.30-P-6002-09GH** **AD82.30-P-6002-02GH**
Front wiper does not function with intermittent wiping	Combination switch (S4) All-Activity Module (AAM) (N10)		**AD82.30-P-6002-01GH**
Front wiper does not stop in rest position when switched off.	Cam-operated switch on wiper motor (M6/1)		**AD82.30-P-6002-07GH**
Rear wiper system inoperative	Rear window wiper/washer switch (S78) All-Activity Module (AAM) (N10)		**AD82.30-P-6002-06GH**
Rear window wiper inoperative	Rear window wiper/washer switch (S78) Rear window wiper motor inoperative (M6/4)		**AD82.30-P-6002-06GH** **AD82.30-P-6002-08GH**
Rear window wiper does not function when washing rear window	Rear window wiper/washer switch (S78)		**AD82.30-P-6002-06GH**
Rear window wiper cannot be switched off	Rear window wiper motor relay (M6/4)		**AD82.30-P-6002-03GH**, **cables**

	Cam-operated switch		
Rear window wiper does not complete a wiping movement	Cam-operated switch on rear window wiper motor (M6/4)		**AD82.30-P-6002-03GH**
Rear window washer pump does not function when washing rear window	Rear window wiper/washer switch (S78)		**AD82.30-P-6002-06GH**
	Rear window washer pump (M5/3)		**AD82.30-P-6002-05GH**

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM INTERMITTENT WIPE - AD82.30-P-6002-01GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Front wiper "Intermittent switch"** HHT actual value		Combination switch (S4) in "Intermittent wipe" position	⊓⊓	• S4
1.1	**Wiper relay (F1k17)** Actuation		Actuation of "Front wiper ON relay"	Relay switches audibly	⇒1.4
1.2	**Wiper motor (M6/1) intermittent wipe switch position** Actuation	30 — F1k17 — 87	Disconnect relay, combination switch (S4) in "Intermittent wipe" position	Motor runs	Value in order: • F1k17 Value not in order: ⇒1.3
1.3	**Wiper motor (M6/1) OFF switch position** Actuation	30 — F1k17 — 87	Disconnect relay, combination switch (S4) in "OFF" position	Motor runs	Value in order: • S4 Value not in order: • Cable • S4 • Wiper motor (M6/1)
1.4	**Wiper relay (F1k17)** Actuation voltage	85 — F1k17 (V) — 86	Actuation of "Front wiper ON relay"	11-14 V	Value in order: • F1k17 Value not in order: • Cable • All-Activity Module (AAM) (N10)

Fig. 106: Wiper System Test Of Electrical System Intermittent Wipe

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM WIPER MOTOR - AD82.30-P-6002-02GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Wiper motor (M6/1) Stage 1** Voltage supply	5 — M6/1 (V) — 4	Disconnect coupling, move combination switch (S4) into "Wiping stage 1" position.	11-14 V	• Cables
1.1	**Wiper motor (M6/1) Stage 2** Voltage supply	5 — M6/1 (V) — 3	Disconnect coupling, move combination switch (S4) into "Wiping stage 2" position	11-14 V	• Cables
1.2	**Wiper motor (M6/1) Stage 1** Actuation	M6/1 5 4	Disconnect coupling, move combination switch (S4) into "Wiping stage 1" position. **Danger! &.3.1.(** AH82.30-P-6100-01Z) Use fuse cable 124 589 37 63 00 for battery connection	Motor runs slowly	• Wiper motor (M6/1)
1.3	**Wiper motor (M6/1) Stage 2** Actuation	M6/1 5 3	Disconnect coupling, move combination switch (S4) into "Wiping stage 1" position. **Danger! &.3.2.(** AH82.30-P-6100-01Z) Use fuse cable 124 589 37 63 00 for battery connection	Motor runs quickly	• Wiper motor (M6/1)

Fig. 107: Wiper System Test Of Electrical System Wiper Motor

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM TAILGATE WIPER RELAY - AD82.30-P-6002-03GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Rear window wiper motor (M6/4)** Actuation	30 — M6/4k1 — 87	Ignition: **ON** Disconnect tailgate wiper motor relay (M6/4k1). **Danger! &.3.1.(** AH82.30-P-6100-01Z) Use fuse cable 124 589 37 63 00 for battery connection	Motor runs	• M6/4
1.1	**Rear window wiper motor (M6/4)** Test cam-operated switch	30 — M6/4k1 — 87a	Move motor out of rest position, as in 1.0 **Danger! &.3.2.(** AH82.30-P-6100-01Z) Use fuse cable 124 589 37 63 00 for battery connection	Motor remains in rest position	• Cam-operated switch on M6/4

Fig. 108: Wiper System Test Of Electrical System Tailgate Wiper Relay

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM WASHER PUMP - AD82.30-P-6002-04GH

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Windshield washer pump (M5/1)** Function	+ ⊥ M5/1 —1 —2	Disconnect plug on motor. Use fuse cable 124 589 37 63 00 for battery connection	Motor runs	• M5/1

Fig. 109: Wiper System Test Of Electrical System Washer Pump

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM TAILGATE WASHER PUMP - AD82.30-P-6002-05GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Rear window washer pump (M5/3)** Function	+ ⊥ M5/3 —1 —2	Disconnect plug on motor Use fuse cable 124 589 37 63 00 for battery connection	M5/3 runs	• M5/3

Fig. 110: Wiper System Test Of Electrical System Tailgate Washer Pump

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM REAR WINDOW WIPER/WASHER SWITCH - AD82.30-P-6002-06GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Rear window wiper/ washer switch Intermittent** HHT actual value		Ignition: ON Rear window wiper/washer switch (S78) in "Intermittent wipe" position.	ON	Value in order: ⇒1.1 Value not in order: ⇒ 1.2
1.1	**Rear window wiper/ washer switch Wash** HHT actual value		Ignition: ON, rear window wiper/washer switch (S78) in "Wash" position.	ON	Value in order: ⇒No fault Value not in order: ⇒ 1.2
1.2	**Voltage supply**	4 S87 ⊥	Ignition ON	11-14 V	Value in order: • Rear window wiper/washer switch (S78) Value not in order: • Cable

Fig. 111: Wiper System Test Of Electrical System Rear Window Wiper/Washer Switch

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM CAM SWITCH - AD82.30-P-6002-07GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Front wiper terminal 31**		Combination switch (S4) in	ON, OFF when passing	• Cables

	b HHT actual value		"Wipe stage 1" position.	through rest position	• Cam-operated switch on wiper motor (M6/1)

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM TAILGATE WIPER MOTOR - AD82.30-P-6002-08GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Rear window wiper motor (M6/4)** Voltage supply	1 — M6/4 (V) — 2	Disconnect coupling Ignition ON.	11-14 V	• Cables
1.1	**Trunk lid wiper motor relay (M6/4k1)** Actuation	3 — M6/4 (V) — 2 1 kΩ	Coupling disconnected, actuation of wiper "Rear wiper relay ON". Resistance of 1 kΩ in parallel with measuring instrument.	11-14 V	• Cables • N10
1.2	**Rear window wiper motor (M6/4)** Actuation	M6/4 1 M6/4k1 30	Disconnect plug on motor and remove relay. **Danger!** &.3.1.(AH82.30-P-6100-01Z) Use fuse cable 124 589 37 63 00 for the battery connection!	Motor runs	Value in order: • Relay M6/4k1 Value not in order: • Rear window wiper motor (M6/4)

Fig. 112: Wiper System Test Of Electrical System Tailgate Wiper Motor

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM WIPER POSITIONS COMBINATION SWITCH - AD82.30-P-6002-09GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Rest position** Contact 1	15 — 19	Combination switch (S4) in rest position	< 1 ohms	• S4
1.1	**Intermittent wipe** Contact 2	15 — 19	Combination switch (S4) in "Intermittent wipe" position	< 1 ohms	• S4
1.2	**Tip wipe** Contact	15 — 18	Combination switch (S4) in "Tip wipe" position	< 1 ohms	• S4
1.3	**Wipe stage 1** Contact	15 — 18	Combination switch (S4) in "Wipe stage 1" pos.	< 1 ohms	• S4
1.4	**Wipe stage**	17 — 18	Combination	< 1 ohms	• S4

	2 Contact		switch (S4) in "Wipe stage 2" pos.		
1.5	**Intermittent wipe** Contact 1	16 18	Combination switch (S4) in "Intermittent wipe" position	< 1 ohms	• S4

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM WASHER POSITION COMBINATION SWITCH - AD82.30-P-6002-10GH

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Wash** Contact	20 18	Combination switch (S4) in "Wash" position	< 1 ohms	• S4

WIPER SYSTEM TEST OF ELECTRICAL SYSTEM - AD82.30-P-6002GH

MODEL 163

	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Wiper system diagnosis, previous knowledge		**AD82.30-P-2002GH**
I	AAM voltage supply in order		**AD54.21-P-6000GH**
II	Battery voltage 11-14V		
III	Fuses in order		
i	Ignition (terminal 15) ON		
⚠ Danger!	**Risk of injury** due to getting jammed or crushed in extreme cases due to limbs being severed by coming into contact with the windshield wiper mechanism	Always remove the ignition key when working on the windshield wiper mechanism.	**AS82.30-Z-0001-01A**
	Testing		
1	Combination switch wiper positions, testing electrical system of wiper system		**AD82.30-P-6002-09GH**
2	Combination switch wash positions, testing		**AD82.30-P-6002-10GH**

	electrical system of wiper system		
3	Intermittent wiper control, testing electrical system of wiper system		**AD82.30-P-6002-01GH**
4	Cam-operated switch, testing electrical system of wiper system		**AD82.30-P-6002-07GH**
5	Wiper motor, testing electrical system of wiper system		**AD82.30-P-6002-02GH**
6	Washer pump, testing electrical system of wiper system		**AD82.30-P-6002-04GH**
7	Trunk lid washer pump, testing electrical system of wiper system		**AD82.30-P-6002-05GH**
8	Trunk lid wiper relay, testing electrical system of wiper system		**AD82.30-P-6002-03GH**
9	Rear window wiper/washer switch, testing electrical system of wiper system		**AD82.30-P-6002-06GH**
10	Trunk lid wiper motor, testing electrical system of wiper system		**AD82.30-P-6002-08GH**

RADIO (RD) DIAGNOSIS, CONTENTS - AD82.60-P-1000AZ

MODEL 124, 129, 140, 163, 168, 170, 202, 208, 210 with MB radio

MODEL 129, 140, 168, 170, 202, 208, 210 with MB radio and navigation operating unit, APS

I 3.1 [] 11	Radio (RD) diagnosis, advanced information		**AD82.60-P-2000A**
I 3.1 [] 12	Radio (RD) diagnosis, function check		**AD82.60-P-3000A**
I 3.1 [] 13	Radio (RD) diagnosis, DTC memory	Models 129, 170, 202, 208, 210 as of 01.06.98 with digital data bus (D2B)	AD82.60-P-4000A
I 3.1 [] 14	Radio (RD) diagnosis, troubleshooting		**AD82.60-P-5000A**
I 3.1 [] 21	Radio (RD), testing		**AD82.60-P-6000A**

	electrical system		

TOOLS, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-2000-01A

Fig. 113: Identifying Electrical Connecting Set (201 589 00 99 00)

Commercially available tools

Number	Designation
WH58.30-Z-1006-09A	Function generator

CONNECTIONS FOR RADIO, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-2000-02A

MB radio in models 129, 168, 170, 202, 208, 210 up to 31.05.98 and models 140, 163

A

1 *Speed-sensitive loudness control (except radio model 163)*
1 *Loudspeaker signal telephone (radio model 163)*
2 *Control output for automatic antenna (Japan only)*
3 *Telephone mute circuit*
4 *Permanent positive (terminal 30)*
5 *Control output for automatic antenna (except Japan) and control output for left/right audio power amplifier (N40/3) control module*
6 *Illumination (terminal 58)*
7 *Switched positive (terminal 15)*
8 *Ground (terminal 31)*

P82.60-0238-04

B

1 *Right rear loudspeaker +*
2 *Right rear loudspeaker -*
3 *Right front loudspeaker +*
4 *Right front loudspeaker -*
5 *Left front loudspeaker +*
6 *Left front loudspeaker -*
7 *Left rear loudspeaker +*
8 *Left rear loudspeaker -*

C

Connection socket for CD changer (except Classic and Spezial with CD magazine compartment), coding (via cable set)

D

Antenna socket

E

Fuse

Fig. 114: Identifying Socket Connections For Radio

RADIO (RD) DIAGNOSIS ADVANCED INFORMATION - AD82.60-P-2000A

MODEL 124, 129, 140, 163, 168, 170, 202, 208, 210 with MB radio

MODEL 129, 140, 168, 170, 202, 208, 210 with MB radio and navigation operating unit, APS

GF	Radio (RD), location of controls	MB Classic radio with traffic news decoder, with RDS up to 08/95	GF82.60-P-0001-02A
		MB Classic radio with traffic news decoder, with RDS as of 09/95 up to 01/97	GF82.60-P-0001-02B
		MB Special radio with traffic news decoder, with RDS up to 05/98	GF82.60-P-0001-02C
		MB Special radio with CD compartment up to 05/98	GF82.60-P-0001-02D
		MB Exquisite radio with traffic news decoder, with RDS up to 05/98	GF82.60-P-0001-02E
		MB Exquisite radio with traffic news decoder, with RDS (J)	GF82.60-P-0001-02F
		MB APS radio and navigation operating unit up to 12/97	GF82.60-P-0001-02G
		MB Audio 5 radio with traffic news decoder, with RDS	GF82.60-P-0001-02H
		MB Hi-line radio (USA)	**GF82.60-P-0001-02I**
		MB Premium radio (USA)	**GF82.60-P-0001-02J**
		MB ML 5 Audio radio	**GF82.60-P-0001-02K**
		MB ML 10 Audio radio	**GF82.60-P-0001-02L**
		MB APS radio and navigation operating unit as of 01/98	GF82.60-P-0001-02M
		MB Radio Audio 10 RDS as of 06/98 up to 06/99	GF82.60-P-0001-02N
		MB Audio 10 RDS radio with CD compartment as of 06/98	GF82.60-P-0001-02O

		MB Radio Audio 30 RDS as of 06/98	GF82.60-P-0001-02P
		MB Audio 30 APS radio	**GF82.61-P-0002-03A**
		MB Radio Audio 10 RDS as of 07/99	GF82.60-P-0001-02T
GF	Location and assignment of cables and connectors	Model 168	GF00.19-P-1000GC
		Model 170	GF00.19-P-1000B
PE	Summary of electric wiring diagrams	Model 208	PE82.00-P-1100D
		Model 202	PE82.00-P-1100D
		Model 163	PE82.00-P-1100E
		Model 168	PE82.00-P-1100GC
		Model 170	PE82.00-P-1100B
		Model 210	PE82.00-P-1100A
		Model 202 up to 05.97 and models 124, 129, 140	Group 82
	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Tools, testing electrical system, radio (RD)		**AD82.60-P-2000-01A**
	Radio connections, testing electrical system, radio (RD)	MB radio in models 129, 168, 170, 202, 208, 210 up to 05/98 and models 140, 163	**AD82.60-P-2000-02A**
		MB APS radio and navigation operating unit in models 129, 140, 210 up to 12/97	AD82.60-P-2000-02B
		MB APS radio and navigation operating unit in models 129, 140, 202, 210 as of 01/98	AD82.60-P-2000-02C
		MB radio code 750a, 753, 756a in models 129, 168, 170, 202, 208, 210 as of 06/98	AD82.60-P-2000-02D
		MB APS radio and navigation operating unit in models 168, 170	**AD82.61-P-2001-02A**
	Adjusting radio and navigation operating unit to loudspeaker system, testing electrical system, radio (RD)	MB APS radio and navigation operating unit in models 129, 140, 210 up to 12/97	AD82.60-P-2000-03A

	Function notes, radio (RD)	Model 129	AD82.60-P-2000-04A

RADIO (RD) DIAGNOSIS, FUNCTION CHECK - AD82.60-P-3000A

MODEL 124, 129, 140, 163, 168, 170, 202, 208, 210 with MB radio

MODEL 129, 140, 168, 170, 202, 208, 210 with MB radio and navigation operating unit, APS

	Radio (RD) diagnosis, advanced information		**AD82.60-P-2000A**
i	• Battery voltage 11-14 V • Fuses okay **Function check**		
Scope of test	**Operation/Requirement**	**Specified value**	**Possible cause/ Remedy**
1 **Radio functions** in accordance with Owner's Manual	Radio: **ON** Set station with good reception (music) or play music cassette or CD. Fader, bass, treble and balance in position 0 (readout in display). Perform all control functions	Radio reception, cassettes/CD operation, loudness, sound and readouts in display must be faultless i Local and atmospheric influences must be taken into account with radio reception. They may cause interference and poor radio reception.	**AD82.60-P-5000A** Models 129, 170,202, 208, 210 as of 06/98 with digital data bus (D2B): ? AD82.60-P-4000A

RADIO (RD) DIAGNOSIS, TROUBLESHOOTING - AD82.60-P-5000A

MODEL 124, 129, 140, 163, 168, 170, 202, 208, 210 with MB radio

MODEL 129, 140, 168, 170, 202, 208, 210 with MB radio and navigation operating unit, APS

	Radio (RD) diagnosis, previous knowledge		**AD82.60-P-2000A**
	Troubleshooting		
Complaint	**Possible cause**	**Note**	**Remedy**
Radio completely inoperative	Voltage supply for radio (A2) or APS radio and		**AD82.60-P-6000-01A**

	navigation operating unit (A2/29)		
No readout in display	Voltage supply for radio (A2) or APS radio and navigation operating unit (A2/29)		**AD82.60-P-6000-01A**
Cassette operation inoperative	Voltage supply for radio (A2) or APS radio and navigation operating unit (A2/29)		**AD82.60-P-6000-01A**
CD operation in radio (A2) inoperative	Voltage supply for radio (A2) with CD compartment		**AD82.60-P-6000-01A**
CD operation, CD changer (A2/6) completely inoperative	Voltage supply for radio (A2) or APS radio and navigation operating unit (A2/29) Voltage supply, CD changer (A2/6)	MB radio and CD changer Models 129, 140, 168, 202, 208, 210 up to 05/98 Models 124, 163 MB APS radio and navigation operating unit and CD changer Models 129, 140,202, 210	**AD82.60-P-6000-01A** **AD82.60-P-6000-01B**
CD operation, CD changer (A2/6) completely inoperative	Voltage supply for radio (A2) or APS radio and navigation operating unit (A2/29) Voltage supply, CD changer (A2/6)	MB radio and CD changer Models 129, 140, 168, 202, 208, 210 as of 06/98 MB APS radio and navigation operating unit and CD changer Model 168	**AD82.60-P-6000-01A** AD82.60-P-6000-01C
Left front loudspeaker inoperative	Radio (A2) or APS radio and navigation operating unit (A2/29), loudspeaker		**AD82.60-P-6000-02A**
Right front loudspeaker inoperative	Radio (A2) or APS radio and navigation operating unit (A2/29), loudspeaker		**AD82.60-P-6000-03A**
Left rear loudspeaker inoperative	Radio (A2) or APS radio and navigation operating unit (A2/29), loudspeaker		**AD82.60-P-6000-04A**
Right rear loudspeaker inoperative	Radio (A2) or APS radio and navigation operating unit (A2/29), loudspeaker		**AD82.60-P-6000-05A**
Radio interference	Radio (A2) or APS radio and navigation operating		**AD82.60-P-6000-06A**

	unit (A2/29), antenna		
Poor radio reception	Radio (A2) or radio and navigation operating unit (APS) (A2/29), antenna, coverage		**AD82.60-P-6000-07A**
Automatic antenna (M11) inoperative	Radio (A2) or radio and navigation operating unit (APS) (A2/29), automatic antenna (M11)	Except (J) (J) only	**AD82.60-P-6000-08A** AD82.60-P-6000-08B
Speed-sensitive loudness control (GAL) inoperative	Radio (A2) or radio and navigation operating unit (APS) (A2/29), vehicle speed signal	Except model 163	AD82.60-P-6000-09A
Radio or radio and navigation operating unit illumination inoperative	Radio (A2) or radio and navigation operating unit (APS) (A2/29)		**AD82.60-P-6000-10A**
Radio mute circuit (Mute) inoperative when using phone	Radio (A2) or radio and navigation operating unit (APS) (A2/29), telephone system		**AD82.60-P-6000-11A**
With auto pilot system (APS): No fader function or loudspeaker sound quality inadequate	Radio and navigation operating unit (APS) (A2/29) not tuned to loudspeaker system	Models 129, 140, 210 up to 31.12.97	AD82.60-P-2000-03A

VOLTAGE SUPPLY, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-01A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Voltage supply Terminal 30	8 (A.8) — A2 (V) — 4 (A.4)	Remove radio or operating unit and disconnect coupling A Carry out measurement at coupling	11–14 V	• Cables ⇒ 1.1
1.1	Voltage supply Terminal 15	8 (A.8) — A2 (V) — 7 (A.7)	Remove radio or operating unit and disconnect coupling A Carry out measurement at coupling Ignition: **ON**	11–14 V	• Cables • Fuse E in radio or in APS radio and navigation operating unit • Radio or APS radio and navigation operating unit

Fig. 115: Voltage Supply, Testing Electrical System, Radio (RD)

VOLTAGE SUPPLY, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-01B

MB radio and CD changer, code 819 in models 129, 140, 168, 202, 208, 210 up to 31.05.98 and in models 124, 163 MB APS radio and navigation operating unit and CD changer, code 819 in models 129, 140, 202, 210

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	● Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Voltage supply, terminal 30 for CD changer **MB radio and CD changer, code 819 in models 129, 140, 168, 202, 208, 210 up to 31.05.98 and in models 124, 163** **MB APS radio and navigation operating unit and CD changer, code 819 in models 129, 140, 202, 210**	C 6 — A2 — C 4	Remove radio or operating unit and disconnect coupling C Carry out measurement at radio or operating unit, chamber C	10–14 V	● Cables ● Fuse E in radio or in APS radio and navigation operating unit ⇒1.1
1.1	Voltage supply for CD changer (A2/6) switched	C 6 — A2 — C 5	Remove radio or operating unit and disconnect coupling C Ignition and radio: **ON** Carry out measurement at radio or operating unit, chamber C	10–14 V	● Cables ● Fuse E in radio or in APS radio and navigation operating unit ● Radio or APS radio and navigation operating unit

Fig. 116: Voltage Supply, Testing Electrical System, Radio (RD)

LEFT FRONT LOUDSPEAKER OUTPUT, TESTING ELECTRICAL SYSTEM RADIO (RD) - AD82.60-P-6000-02A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	● Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Left front loudspeaker output	B 6 — A2 — B 5	Remove radio or operating unit and disconnect coupling B Radio: **ON** Carry out measurement at radio or operating unit, chamber B Adjust loudness control to "loud"	>0.2 V~	● Radio or APS radio and navigation operating unit ● Values in order: Loudspeaker system or sound system

Fig. 117: Left Front Loudspeaker Output, Testing Electrical System Radio (RD)

RIGHT FRONT LOUDSPEAKER OUTPUT, TESTING ELECTRICAL SYSTEM RADIO (RD) - AD82.60-P-6000-03A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	● Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Right front loudspeaker output	B 4 — A2 — B 3	Remove radio or operating unit and disconnect coupling B Radio: **ON** Carry out measurement at radio or operating unit, chamber B Adjust loudness control to "loud"	>0.2 V~	● Radio or APS radio and navigation operating unit ● Values in order: Loudspeaker system or sound system

Fig. 118: Right Front Loudspeaker Output, Testing Electrical System Radio (RD)

LEFT REAR LOUDSPEAKER OUTPUT, TESTING ELECTRICAL SYSTEM RADIO (RD) - AD82.60-P-6000-04A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Left rear loudspeaker output	B 8 — A2 (V) — B 7	Remove radio or operating unit and disconnect coupling B Radio: **ON** Carry out measurement at radio or operating unit, chamber B Adjust loudness control to "loud"	>0.2 V~	• Radio or APS radio and navigation operating unit • Values in order: Loudspeaker system or sound system

Fig. 119: Left Rear Loudspeaker Output, Testing Electrical System Radio (RD)

RIGHT REAR LOUDSPEAKER OUTPUT, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-05A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) orradio and navigation operating unit (APS) (A2/29)** Right rear loudspeaker output	B 2 — A2 (V) — B 1	Remove radio or operating unit and disconnect coupling B Radio: **ON** Carry out measurement at radio or operating unit, chamber B Adjust loudness control to "loud"	>0.2 V~	• Radio or APS radio and navigation operating unit • Values in order: Loudspeaker system or sound system

Fig. 120: Right Rear Loudspeaker Output, Testing Electrical System, Radio (RD)

RADIO INTERFERENCE, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-06A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) or Radio : navigation operating unit (APS) (A2/29)** Radio interference when engine is not running		Radio: **ON** Set even transmitter frequency without transmitter reception (e.g. 96.0). Ignition: **ON**	No interference	• Ground connections • Cables • Electronic components ==>1.1
1.1	**Radio interference when engine is running**		Radio: **ON** Set even transmitter frequency without transmitter reception (e.g.	No interference	• Ground connections • Cables

			96.0) Engine: **Start**		• Electronic components • Ignition system • Engine timing • Values in order : Antenna systems (AS)

RADIO RECEPTION, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-07A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) or Radio : navigation operating unit (APS) (A2/29)** Radio reception		Radio: **ON** Set station with good reception: Carry out road test	Radio reception in order	• Ground connections • Cables • Radio or APS radio and navigation operating unit • Radio transmitter • Broadcasting corporation • Values in order: Antenna systems (AS)

ACTUATION FOR AUTOMATIC ANTENNA, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-08A

expect (J)

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) or radio and navigation operating unit APS (A2/29)** Actuation of automatic antenna (M11)/antenna systems (AS)/left/right audio power amplifier control module **except** (J)	8 (A.8) — A2 (V) — 5 (A.5)	Remove radio or operating unit Do not disconnect couplings Carry out test at coupling A Radio: **ON**	9–14 V	• Radio or APS radio and navigation operating unit • Values in order: Antenna systems (AS) and/or sound system

Fig. 121: Actuation For Automatic Antenna, Testing Electrical System, Radio (RD)

RADIO ILLUMINATION, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-10A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) orAPS radio and navigation operating unit (A2/29)** Radio illumination when side light is switched off	8 (A.8) — A2 (V) — 7 (A.7)	Remove radio or operating unit Do not disconnect couplings Carry out test at coupling A Ignition: **ON** Radio: **ON**	11 - 14 V **"ON"** button illuminated **"ON"** button and display illuminated	• Cables • Fuse E in radio or in APS radio and navigation operating unit • Radio or APS radio and navigation operating unit ⇒1.1
1.1	Radio illumination when side light is switched on	8 (A.8) — A2 (V) — 6 (A.6)	Remove radio or operating unit Do not disconnect couplings Carry out test at coupling A Side light: **ON** Radio: **ON**	11 - 14 V Controls illuminated Controls and display illuminated	• Cables • Fuse E in radio or in APS radio and navigation operating unit • Radio or APS radio and navigation operating unit

Fig. 122: Radio Illumination, Testing Electrical System, Radio (RD)

RADIO MUTE CIRCUIT, TESTING ELECTRICAL SYSTEM, RADIO (RD) - AD82.60-P-6000-11A

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Radio (A2) or radio and navigation operating unit (APS) (A2/29)** Radio mute circuit through telephone system (phone)	8 (A.8) — 3 (A.3)	Remove radio or operating unit Do not disconnect couplings Carry out test at coupling A Radio: **ON**	Radio switches to mute, **PHONE** appears in display	• Cables • Radio or APS radio and navigation operating unit • Telephone system

RADIO (RD), TESTING ELECTRICAL SYSTEM - AD82.60-P-6000A

MODEL 124, 129, 140, 163, 168, 170, 202, 208, 210 with MB radio

MODEL 129, 140, 168, 170, 202, 208, 210 with MB radio and navigation operating unit

	Radio (RD) diagnosis, advanced information		**AD82.60-P-2000A**
i	• Carry out test of loudspeaker outputs		

	additionally with one individual loudspeaker. • In the event of reception faults, carry out test additionally with a separate antenna. • Switch off radio for disconnecting and connecting connections and connectors on the radio and loudspeaker system. • Battery voltage 1114 V • Fuses in order		
	Testing		
1	Voltage supply, testing electrical system, radio (RD)	Voltage supply for radio, terminal 30	**AD82.60-P-6000-01A**
2	Voltage supply, testing electrical system, radio (RD)	Voltage supply for CD changer in models 129, 140, 168, 202, 208, 210 up to 05/98 and models 124, 163	**AD82.60-P-6000-01B**
3	Voltage supply, testing electrical system, radio (RD)	Voltage supply for CD changer in models 129, 140, 168, 202, 208, 210 as of 06/98	AD82.60-P-6000-01C
4	Left front loudspeaker output, testing electrical system, radio (RD)		**AD82.60-P-6000-02A**
5	Right front loudspeaker output, testing electrical system, radio (RD)		**AD82.60-P-6000-03A**
6	Left rear loudspeaker output, testing electrical system, radio (RD)		**AD82.60-P-6000-04A**
7	Right rear loudspeaker output, testing electrical system, radio (RD)		**AD82.60-P-6000-05A**
8	Radio interference, testing electrical system, radio (RD)		**AD82.60-P-6000-06A**
9	Radio reception, testing electrical system, radio (RD)		**AD82.60-P-6000-07A**
10	Actuation for automatic antenna, testing electrical	except (J)	**AD82.60-P-6000-08A**

	system, radio (RD)		
11	Actuation for automatic antenna, testing electrical system, radio (RD)	only (J)	AD82.60-P-6000-08B
12	Speed-sensistive loudness control, testing electrical system, radio (RD)	except model 163	AD82.60-P-6000-09A
13	Radio illumination, testing electrical system, radio (RD)		**AD82.60-P-6000-10A**
14	Radio mute circuit, testing electrical system, radio (RD)		**AD82.60-P-6000-11A**

CONTENTS - AUDIO 30 APS DIAGNOSIS - AD82.61-P-1001AZ

MODEL 163,168,170, 208, 210 with CODE (353) Audio 30 APS

I 9.4 [] 11	Audio 30 APS diagnosis, basic knowledge		**AD82.61-P-2001A**
I 9.4 [] 12	Audio 30 APS diagnosis, function check		**AD82.61-P-3001A**
I 9.4 [] 13	Audio 30 APS diagnosis, DTC memory		**AD82.61-P-4002A**
I 9.4 [] 14	Audio 30 APS diagnosis, troubleshooting		**AD82.61-P-5001A**
I 9.4 [] 21	Audio 30 APS, testing electric system		**AD82.61-P-6001A**

AUDIO 30 APS DIAGNOSIS TOOLS - AD82.61-P-2001-01A

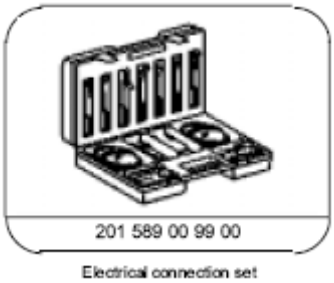


Fig. 123: Identifying Electrical Connection Set (201 589 00 99 00)

Fig. 124: Identifying Adapter Cable (140 589 22 63 00)

Commercially available tools

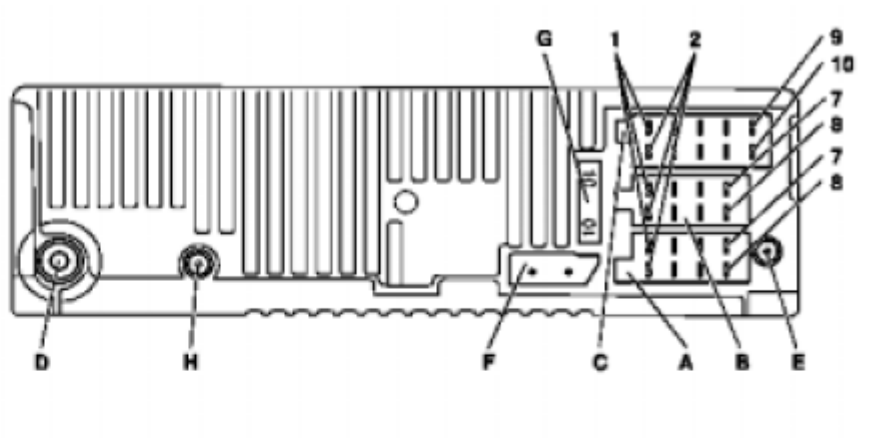
Number	Designation
WH58.30-Z-1001-09A	Multimeter

	Designation		
	MB radio removal tool (000 833 03 61)		

RADIO AND NAVIGATION UNIT CONNECTOR ASSIGNMENTS - AD82.61-P-2001-02A

Connectors on radio and navigation unit (A2/56)

A Connector A
B Connector B
C Connector C
D FM/AM antenna input
E GPS antenna input and direct voltage supply for GPS antenna
F Connector for digital data bus (D2B)
G Fuse
H ZF output (can only be used with FM antenna systems with diversity function)



P82.61-2187-05

Connector A

1 Wheel speed signal
2 Diagnosis (K bus)
3 Mute signal from telephone (optional)
4 C. 30 (continuous positive)
5 Voltage supply for FM/AM antenna amplifier and on/off signal of left/right audio power amplifier (N40/3)
6 C. 58 d (lighting)
(not used on models 208, 210, because via CAN)
7 C. 15 (switched positive)
8 C. 31 (ground)

Connector B

1 Right rear loudspeaker +
2 Right rear loudspeaker -
3 Right front loudspeaker +
4 Right front loudspeaker -
5 Left front loudspeaker +
6 Left front loudspeaker -
7 Left rear loudspeaker +
8 Left rear loudspeaker -

Connector C

1 CAN "High"
(not used on models 163, 168, 170)
2 CAN "Low"
(not used on models 163, 168, 170)
3 Signal for reversing
(not used on models 208, 210, because via CAN)
4 Wake-up signal for components of digital data bus (D2B)
5 Terminal 30 for CD changer (A2/6)
6 Terminal 31 for CD changer (A2/6)
7 -
8 -
9 -
10 -

Fig. 125: Identifying Radio And Navigation Unit Connector Assignments

VERSION CODING FOR RADIO AND NAVIGATION UNIT - AD82.61-P-2001-03A

The table below shows the possible **navigation system** adaptations to the vehicle. The settings can be changed with the aid of the handheld tester ("HHT").

Navigation parameters	Possible settings	
ABS pulse count (pulse count from wheel speed sensor per wheel rotation)	Factory setting:	48 (passenger cars)
Tire size	e.g.:	195/50/15
Tire condition i Coding is required only when tires are changed. Tire wear occurring while driving is recognized automatically by the navigation system.	New:	Guideline values: Tread depth greater than 5 mm

	Used:	Tread depth less than 5 mm

AUDIO 30 APS DIAGNOSIS, BASIC KNOWLEDGE - AD82.61-P-2001A

MODEL 163,168,170, 208, 210 with CODE (353) Audio 30 APS

	In order to avoid damage to control modules, connectors must only be disconnected or connected with "**terminal 15R:OFF** "		
i	Local or atmospheric influences can cause disruption to radio or satellite reception. Satellite reception is possible only in the open air.		
i	Position finding with assistance of global positioning system data (in degrees of longitude and latitude) takes place within a period of 1 to 20min after "ignition: **ON** ".		
i	The **audio 30 APS** is a **navigation system** with integrated radio and **CD player and** . It also provides an interface for external audio components via a digital data bus (D2B). Existing DMNL deals mainly with navigation system. Diagnosis of the following systems: **radio, D2B, loudspeaker system (LS), CD changer and sound system** can be extracted from the appropriate DMNL.		
GF	Audio 30 APS operating		**GF82.61-P-0002-03A**

	notes		
GF	Audio 30 APS location of components	Model 163	**GF82.61-P-0002-01D**
		Model 168	GF82.61-P-0002-01B
		Model 170	GF82.61-P-0002-01A
		Models 208, 210	GF82.61-P-0002-01C
GF	Location and assignment of cable and plug connections	Model 163	GF00.19-P-1000E
		Model 168	GF00.19-P-1000GC
		Model 170	GF00.19-P-1000B
		Model 208	GF00.19-P-1000D
		Model 210	GF00.19-P-1000A
PE	Overview of electrical wiring diagrams	Model 163	PE82.00-P-1100E
		Model 168	PE82.00-P-1100GC
		Model 170	PE82.00-P-1100B
		Model 208	PE82.00-P-1100D
		Model 210	PE82.00-P-1100A
	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Diagnostic tools, Audio 30 APS		**AD82.61-P-2001-01A**
	Variant coding, radio and navigation unit		**AD82.61-P-2001-03A**
	Connector assignment, radio and navigation unit		**AD82.61-P-2001-02A**

AUDIO 30 APS DIAGNOSIS, FUNCTION CHECK - AD82.61-P-3001A

MODEL 163,168,170, 208, 210 with CODE (353) Audio 30 APS

	Audio 30 APS diagnosis, basic knowledge		**AD82.61-P-2001A**
i	See specified diagnosis manuals for function checks on the following systems: radio (RD), AM/FM antenna systems (ATS) and loudspeaker system (LSA).		
i	Fuses okay		
i	Battery voltage 11-14 V		
	Function check		
Scope of test	**Action/prerequisites**	**Nominal value**	**Possible cause /**

			remedy
1 GPS reception	Vehicle outdoors under free sky Ignition: **ON** Radio and navigation unit (A2/56): **ON** Press "I" button (info). Wait a few minutes if necessary.	The current location is indicated in terms of latitude and longitude, e.g.: LONGIT. 9:01.37E LATIT. 48:42.17N In addition, the number of satellites received is indicated. It is necessary to receive at least 3 satellite signals for two-dimensional GPS location finding. Local or atmospheric influences can cause interruptions in the reception of the GPS signals.	**AD82.61-P-5001A**
2 Navigation	Ignition: **ON** Radio and navigation unit (A2/56): **ON** If necessary: insert navigation CD ROM into **radio and navigation unit (A2/56)** . Press "NAV" button. Check GPS reception (see above) Enter a destination in the vicinity with the aid of the "ADDRESS ENTRY" menu and activate guidance feature by selecting: FASTEST ROUTE or SHORTEST ROUTE or OWN SETTINGS. Drive vehicle along test route	Route calculation may take up to 30 s. Recommendations for guidance or output on the radio loudspeakers (**voice output**) and on the A2/56 display with the aid of route guidance symbols (**pictograms**). Pay particular attention to the time the voice messages are output (the messages should not be output too early or too late). Also observe bar graph display. i If the vehicle is on a "non-digitized" road (company yard, parking lot, country road) the display "OFF ROAD" appears. When driving outside of the digitized map boundaries the display "OFF MAP" appears.	**AD82.61-P-5001A**

AUDIO 30 APS DIAGNOSIS, DTC MEMORY - AD82.61-P-4002A

MODELS 163,168,170, 208, 210 with CODE (353) Audio 30 APS

	Audio 30 APS diagnosis, previous knowledge		**AD82.61-P-2001A**
	Connect hand-held-tester (HHT), read out diagnostic trouble code memory	Model 163 up to 31.8.01, 168 Models 170, 208, 210	**AD00.00-P-2000-03C** **AD00.00-P-2000-03A**
i	Communication between the HHT and all other D2B components also takes place via the diagnostic interface of the **radio and navigation unit (A2/56)** . For**DTC's** affecting the **digital data bus (D2B)** , the**CD changer (A2/6)** and the **sound system** , remedy measures are given in the corresponding diagnosis manuals.	See also: Information/Communication Diagnosis Manual Index 13.1 Digital data bus (D2B) See also: Information/Communication Diagnosis Manual Index 6.1 Compact disc player with CD changer	AD82.00-P-1000AZ **AD82.64-P-1000AZ**
i	Fuses okay		
i	Battery voltage 11-14V		
i	The RDS data evaluation is deactivated during HHT diagnosis.		
	Diagnostic trouble code memory		
DTC	**Possible cause**	**Note**	**Remedy**
No fault code	No fault detected	Nevertheless if there is a complaint: ? Audio 30 APS diagnosis, troubleshooting	**AD82.61-P-5001A**
B1000	Internal error in **radio and navigation unit**		A2/56

	(A2/56)		
B1010	**Radio and navigation unit (A2/56)** switches off due to undervoltage		**AD82.61-P-6001-01A**
B1011	**Radio and navigation unit (A2/56)** switches off due to overvoltage		**AD82.61-P-6001-01A**
B1088	**Only on model 208, 210:** Malfunction in CAN connection between **instrument cluster (A1)** and **radio and navigation unit (A2/56)**	i The **radio and navigation unit (A2/56)** is connected to the **instrument cluster (A1)** via a separate CAN bus. Read out **instrument cluster (A1)** DTC memory	CAN line between A1 and A2/56
B1734	**Model 163:** Wheel speed signal from CAN bus adapter missing **Model 168:** Signal from **left rear wheel speed sensor (L6/3)** missing **Model 170:** Signal from **left front wheel speed sensor (L6/1)** missing **Models 208, 210:** Signal from **right front wheel speed sensor (L6/2)** missing	i The wheel speed signals are passed to the **radio and navigation unit (A2/56)** via a separate line and not directly on CAN. See also: Chassis Diagnosis Manual, index 9 or index 10: ? **Index 10.4 ESP** (Model 163) **Index 10.3 ESP** (Model 168) **Index 10.2 ESP** (Model 208, 210) **Index 10.5 ESP** (Model 208)	**AD82.61-P-6001-03A** **AD42.45-P-1002AZ** AD42.45-P-1002GCZ AD42.45-P-1000AZ See STAR DIAGNOSIS
B1738	**Models 168, 208.4: GPS antenna (A2/49a2)** or lead defective **Models 170, 208.3: Rear GPS antenna (A2/23a2)** or lead defective **Model 163: Telephone and GPS roof antenna (A2/49)** or **telephone and**	i The GPS and telephone radio signals are transmitted between A2/49 and A2/57 via a common antenna cable.	AD82.61-P-6001-05A **AD82.61-P-6001-05B**

	GPS antenna splitter (A2/57) or lead defective		
B1763	Excessive temperature or reading error of CD drive of **radio and navigation unit (A2/56)**		Remove CD-ROM from drive and check for contamination and damage. A2/56
B1765	Gyrosensor defective		A2/56
N1111 N1112 N1113 N1114 N1115 N1116 N1117 N1118	Fiber optic cable defective, Individual D2B units defective or power supply for individual D2B units	See also: ? Information/Communication Diagnosis Manual Index 13.1 Digital data bus (D2B)	Model 168, 170, 208, 210 AD82.00-P-4000A
N1140	**Only on model 208, 210:** DTC in CAN connection between **instrument cluster (A1) and radio and navigation unit (A2/56)**	i The **radio and navigation unit (A2/56)** is connected to the **instrument cluster (A1)** via a separate CAN bus. DTC memory for **instrument cluster (A1)**	CAN line between A1 and A2/56
N1141	Nominal-actual configuration of D2B ring varies	See also: ? Information/Communication Diagnosis Manual Index 13.1 Digital data bus (D2B)	Reconfigure system AD82.00-P-4000A
N1250	CD changer Excess temperature		Lower temperature inside vehicle
N1251	CD changer CD reading error		Check CD changer
N1252	CD changer CD magazine error		Check CD magazine
N1253	CD changer Hardware error (mechanical)		Check hardware components and replace if necessary
N1254	CD changer Insufficient temperature		Heating passenger compartment

AUDIO 30 APS DIAGNOSIS, TROUBLESHOOTING - AD82.61-P-5001A

MODEL 163,168,170, 208, 210 with CODE (353) Audio 30 APS

GF	Audio 30 APS operating notes		**GF82.61-P-0002-03A**
GF	Audio 30 APS location of components	Model 163 Model 168 Model 170 Models 208, 210	**GF82.61-P-0002-01D** GF82.61-P-0002-01B GF82.61-P-0002-01A GF82.61-P-0002-01C
	Audio 30 APS diagnosis, previous knowledge		**AD82.61-P-2001A**
i	Battery voltage 11-14V		
	Troubleshooting		
Complaint	**Cause**	**Note**	**Remedy**
Radio and navigation unit (A2/56) completely inoperative	Fuse in A2/56, Voltage supply for A2/56, Defect at navigation CD-ROM, A2/56		**AD82.61-P-6001-01A**
No communication possible between Hand-Held Tester (HHT) and Audio 30 APS	K line, Radio and navigation unit (A2/56)		**AD82.61-P-6001-02A**
Navigation inoperative	Navigation CD-ROM is not loaded or is incorrectly loaded or incorrect / defective CD-ROM Radio and navigation unit (A2/56)		Load navigation CD, refer to: **GF82.61-P-0002-03A**
Destination finding system messages are given too early or too late (e.g. "please turn right")	Check wheel calibration and variant coding		**AD82.61-P-2001-03A**
The **expected arrival time** is not correct	Time on radio and navigation unit (A2/56) is incorrectly set		Actuate "NAV" pushbutton and activate "CLOCK" menu, set time
Navigation is defective or imprecise	Check variant coding and wheel calibration, Reversing signal, Wheel speed signal, Models 163, 168, 208.3, 210: Cellular telephone and GPS roof antenna (A2/49), Models 170, 208.4: GPS rear antenna (A2/23a2)	Models 163, 168, 170 Models 208, 210	Refer to: **AD82.61-P-2001-03A** **AD82.61-P-6001-04A** AD82.61-P-6001-04B **AD82.61-P-6001-03A** AD82.61-P-6001-05A

	Radio and navigation unit (A2/56)		
No reception of **GPS data**	Antenna cable or Model 163: Cellular telephone and GPS roof antenna (A2/49) or cellular telephone and GPS antenna splitter (A2/57) Models 168, 208.3, 210: Cellular telephone and GPS roof antenna (A2/49) Models 170, 208.4: GPS rear antenna (A2/23a2) Radio and navigation unit (A2/56)	i On model 163 only one antenna cable (for telephone and GPS) leads to A2/49. A defective antenna cable would therefore effect a telephone, if connected.	Model 163 **AD82.61-P-6001-05B** Models 168, 170,208,210 AD82.61-P-6001-05A
Radio or loudspeaker functional faults and **poor sound with voice output**	Loudspeaker system or amplifier outputs of radio and navigation unit (A2/56). Only with sound system (code 810): Left/right audio power amplifier (N40/3)	Antenna amplifier test can be carried out using HHT.	Refer to DMNL information / communication Index 3 (RD) Index 5 (LS)
Voice output is fragmentary or inoperative, but audio signal replay (e.g. CD player) functions without complaint.	Voice in RAM of **navigation computer** is partly erased as a result of an interruption in voltage supply. Data fault on navigation CD-ROM Radio and navigation unit (A2/56)	i Avoid excessive shaking while loading voice on A2/56.	Replace CD-ROM
Illumination of radio and navigation unit (A2/56) inoperative (with terminal 58d, ON)	Terminal 58d signal is not on **radio and navigation unit (A2/56)** . i On models 208, 210, terminal 58d is not connected, because A2/56 is connected to A1 via CAN.		**AD82.61-P-6001-06A**

	Scope of test	Test instrument / test connection	Action / prerequisites	Nominal value	● Possible cause / remedy
1.0	**Radio and navigation unit (A2/56)** Power supply Circuit 30	8 (A.8) — A2/56 — 4 (A.4)	A2/56 removed Connector A disconnected	11 - 14 V	● **Model 163:** F21 in fuse and relay box (F1) ● **Model 168:** f32 in F1 ● **Model 170:** f8 in F1 ● **Model 208:** f10 in F1 ● **Model 210:** f5 in rear fuse box (F4) ● Cables Value okay: ⇒1.1
1.1	Power supply Circuit 15R	8 (A.8) — A2/56 — 7 (A.7)	A2/56 removed Connector A disconnected Ignition / starter switch: **Position 1**	11 - 14 V	● **Model 163:** f10 in F1 ● **Model 168:** f12 in F1 ● **Model 170:** f5 in F1 ● **Model 208:** f3 in F1 ● **Model 210:** f11 in F1 ● Cables

Fig. 126: Radio And Navigation Unit, Power Supply, Checking Electrical System, Audio 30 APS

HHT INTERFACE, TESTING, ELECTRICAL SYSTEM, AUDIO 30 APS - AD82.61-P-6001-02A

	Scope of test	Test instrument / test connection	Action / Prerequisites	Nominal value	● Possible cause / remedy
1.0	**HHT interface** Discontinuity in diagnostic line (K bus) to data link connector (X11 / 4) **Model 163, 168** **Model 170, 210** **Model 208**	X11/4 — A2/56 — 2 (A.2) 12 — X11/4 — A2/56 — 2 (A.2) 33 — X11/4 — A2/56 — 2 (A.2) 32	Connector A disconnected from A2/56	< 1 Ω < 1 Ω < 1 Ω	● Wiring

Fig. 127: HHT Interface, Testing, Electrical System, Audio 30 APS

AUDIO 30 APS TEST OF ELECTRICAL SYSTEM WHEEL SPEED SIGNAL - AD82.61-P-6001-03A

&(AD42.45-P-1002BZ)

	Scope of test	Tester/test connection	Operation/ Requirement	Specified value	• Possible cause/ Remedy
1.0	**Radio and navigation unit (A2/56)** Wheel speed signal from traction system control module (N47) **Models 163, 170:** left front **Model 168:** left rear (LR) **Models 208, 210:** right front		Lift vehicle off the ground (**Model 168:** rear **Models 163, 170, 208, 210:** front) Ignition: **ON** Spin the corresponding wheel by hand, obtaining a readout of the actual navigation value in the pocess. i On models 168, 170, 208 and 210 the wheel speed signal arrives at A2/56 directly from N47, on model 163 the signal gets there passing through a separate line from the CAN-bus adapter.	Actual value for the rotational speed is indicated.	• Confirm corresponding actual value reading obtained with HHT in N47, If actual value there matches.: ⇒1.1 See also: DM Chassis, Index 9 or 10 ↓ Ind. 10.4 ESP (Model 163): AD42.45-P-1002AZ Ind. 10.3 ESP (Model 168): AD42.45-P-1002GCZ Ind. 10.2 ESP (Models 208, 210): AD42.45-P-1000AZ Ind.10.5 ESP (Model 208): See STAR DIAGNOSIS
1.1	Wheel speed signal from traction system control module (N47), measured with oscilloscope **Model 168:** left rear (LR) **Model 163, 170:** left front **Models 208, 210:** right front	8 (A.8) — A2/56 — 1 (A.1)	Remove A2/56 Unplug coupling A Oscilloscop settings: Duration: ca. 50 ms Amplitude: ca. 10 V/div Ignition: **ON** Spin the corresponding wheel by hand	Rectangular wave signal whose frequency changes with the rotational speed of the wheel.	Model 163: • Line from transfer case control module (N78) to CAN-bus adapter • Line from CAN-bus adapter to A2/56 • CAN-bus adapter Models 168, 170, 208, 210: • Line from N47 to A2/56 Value matches nevertheless complaint: • A2/56

Fig. 128: Audio 30 APS Test Of Electrical System Wheel Speed Signal

REVERSE SIGNAL, TESTING, ELECTRICAL SYSTEM, AUDIO 30 APS - AD82.61-P-6001-04A

	Scope of test	Test instrument / test connection	Action / Prerequisites	Nominal value	• Possible cause / remedy
1.0	**Reversing signal** **Models 163, 168, 170**		Ignition: **ON** Selector lever in position "R" or reverse gear engaged Read out HHT actual value at **radio and navigation unit (A2/56)**	Reverse lamp Status: ON	⇒1.1
1.1	Reverse gear, measure signal voltage	⊥ — A2/56 — 3 (C.3)	Disconnect connector C at **radio and navigation unit (A2/56)** . Ignition: **ON** Selector lever in position "R" or reverse gear engaged. i On model 163 with AT the reversing signal travels via a discrete cable from CAN bus adapter to A2/56.	11-14 V	• Cables • **With manual transmission (MT)** ↓ Backup lamp switch (S16/2) • **With automatic transmission (AT)** ↓ **Model 163:** CAN bus adapter **Model 168:** Transmission range recognition module (A61) **Model 170:** Transmission range recognition switch (S16/10)

Fig. 129: Reverse Signal, Testing, Electrical System, Audio 30 APS

AUDIO 30 APS TEST OF ELECTRICAL SYSTEM GPS ANTENNA - AD82.61-P-6001-05B

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Cellular telephone and GPS roof antenna (A2/49) and cellular telephone and GPS antenna splitter (A2/57) Model 163**		Ignition: **ON** Free view of sky is necessary. Read out actual navigation values. GPS antenna signals travel via the **cellular telephone and GPS splitter (A2/57)** to the radio and navigation unit (A2/56). Also check the telephone connected to A2/57 if necessary.	Display of vehicle position in degrees of longitude and latitude and display of "visible" and available satellites.	• Atmospheric interruptions, signal shadows and reflections from buildings can affect GPS reception. ⇒1.1
1.1	Measure voltage supply of cellular telephone and GPS splitter (A2/57) at A2/56	(E) — A2/56 (V) — Inner conductor — (E)	Connector E disconnected at A2/56. Measurement takes place at A2/56. Ignition: **ON** A2/56: **ON** Use adapter cable 140 589 22 63 00 for inner conductor.	approx. 5 V	• A2/56 Value in order: ⇒1.2
1.2	Measure voltage supply of cellular telephone and GPS roof antenna (A2/49) at A2/57	Housing — A2/57 (V) — Inner conductor	Connector E connected at A2/56. Coaxial connector connected at A2/57 (bush with inscription: GPS). Coaxial connector disconnected at A2/57 (bush with inscription: Antenna). Measurement takes place at center connection of A2/57. Ignition: **ON** A2/56: **ON**	approx. 5 V	• Coaxial cable between A2/56 and A2/57 • A2/57 Value in order: ⇒1.3
1.3	Check coaxial cable and cellular telephone and GPS roof antenna (A2/49) for short-circuit	Shield — A2/57 (Ω) — Inner conductor	Ignition: **OFF** Disconnect coaxial connector at A2/57 (bush with inscription: Antenna). Measurement takes place at plug of disconnected antenna cable towards A2/49	> 5 Ω	• Coaxial cable from A2/57 to A2/49 • A2/49 Value in order but complaint persists: • Open-circuit in coaxial cable between A2/57 and A2/49 • A2/49

Fig. 130: Audio 30 APS Test Of Electrical System GPS Antenna

RADIO AND NAVIGATION UNIT, ILLUMINATION, TESTING, ELECTRICAL SYSTEM, AUDIO SYSTEM 30 APS - AD82.61-P-6001-06A

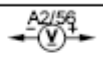
	Scope of tests	Test instrument / test connection	Action / Prerequisites	Nominal value	• Possible cause / remedy
1.0	**Radio and navigation unit (A2/56)** Measure voltage supply from terminal 58d **Models 163, 168, 170**		Disconnect connector A from A2/56. Switch ON parking lamps with rotary light switch (S1). i The reading depends on the position of the dimmer. i On models 208, 210 terminal 58d is not connected. The appropriate information comes for A1 via CAN.	approx. 9 V	• Wiring Value okay, however, illumination does not function: • A2/56

Fig. 131: Radio And Navigation Unit, Illumination, Testing, Electrical System, Audio System 30 APS

AUDIO 30 APS, TESTING, ELECTRICAL SYSTEM - AD82.61-P-6001A

MODEL 163,168,170, 208, 210 with CODE (353) Audio 30 APS

GF	Audio 30 APS, location of components	Model 163	**GF82.61-P-0002-01D**
GF	Audio 30 APS, location of components	Model 168	GF82.61-P-0002-01B
GF	Audio 30 APS, location of components	Model 170	GF82.61-P-0002-01A
GF	Audio 30 APS, location of components	Model 208, 210	GF82.61-P-0002-01C
GF	Audio 30 APS operating instructions		**GF82.61-P-0002-03A**
GF	Audio 30 APS diagnosis, basic knowledge		**AD82.61-P-2001A**
	Connector assignments on radio and navigation unit		**AD82.61-P-2001-02A**
i	Battery voltage 11 -14 V		
	Testing		
1	Radio and navigation unit power supply, testing, electrical system, Audio 30 APS		**AD82.61-P-6001-01A**
2	HHT interface, testing, electrical system, Audio 30 APS		**AD82.61-P-6001-02A**
3	Wheel speed signal, testing, electrical system, Audio 30 APS		**AD82.61-P-6001-03A**

4	Backup signal, testing, electrical system, Audio 30 APS Model 163, 168, 170		**AD82.61-P-6001-04A**
5	Backup signal, testing, electrical system, Audio 30 APS Model 208, 210		AD82.61-P-6001-04B
6	GPS antenna, testing, electrical system, Audio 30 APS	Model 168, 170, 208, 210	AD82.61-P-6001-05A
7	GPS antenna, testing, electrical system, Audio 30 APS	Model 163	**AD82.61-P-6001-05B**
8	Radio and navigation unit, illumination, testing, electrical system, Audio 30 APS		**AD82.61-P-6001-06A**

ANTENNA SYSTEM (AS) DIAGNOSIS, CONTENTS - AD82.62-P-1000AZ

MODELS 163, 168, 202.078 /080 /083 /182 /188, 208 (except, 208.4), 202.01 /02/12 as of 1.1.97, 210.0 /2

I 4.4 [] 11	Antenna system (AS) diagnosis, previous knowledge		**AD82.62-P-2000A**
I 4.4 [] 12	Antenna system (AS) diagnosis, function check		**AD82.62-P-3000A**
I 4.4 [] 21	Antenna systems (AS), testing electrical system		**AD82.62-P-6000A**

SPEAKER SYSTEM (LSA) DIAGNOSIS CONTENTS - AD82.62-P-1001AZ

MODEL 163 with CODE (491) U.S. version with CODE (259) Radio Premium with Bose sound system

MODEL 163 with CODE (259a) Radio ML 10 with sound system except CODE (491) U.S. version

MODEL 208 with CODE (810) Sound system with MB radio

I 5.13 [] 11	Loudspeaker system (LS) diagnosis, previous knowledge		**AD82.62-P-2001A**
I 5.13 [] 12	Loudspeaker system (LS) diagnosis, function check		**AD82.62-P-3001A**
I 5.13 [] 13a	Loudspeaker system (LS) diagnosis, troubleshooting	Model 208	AD82.62-P-5001A

I 5.13 [] 13b	Loudspeaker system (LS) diagnosis, troubleshooting	Model 163	**AD82.62-P-5001E**
I 5.13 [] 21a	Loudspeaker system (LS) testing electrical system	Model 208	AD82.62-P-6001A
I 5.13 [] 21b	Loudspeaker system (LS) testing electrical system	Model 163	**AD82.62-P-6001E**

LOUDSPEAKER SYSTEM (LS) DIAGNOSIS, CONTENTS - AD82.62-P-1001BZ

MODEL 163 with CODE (491) U.S. version with CODE (257) Radio Hi-Line

MODEL 163 with CODE (257a) Radio ML 5 except CODE (491) U.S. version

MODEL 168,208 with MB radio

I 5.12 [] 11	Loudspeaker system (LS) diagnosis, advanced information		**AD82.62-P-2001B**
I 5.12 [] 12	Loudspeaker system (LS) diagnosis, function check		**AD82.62-P-3001A**
I 5.12 [] 13a	Loudspeaker system (LS) diagnosis, troubleshooting	Model 208	AD82.62-P-5001B
I 5.12 [] 13b	Loudspeaker system (LS) diagnosis, troubleshooting	Model 168	AD82.62-P-5001C
I 5.12 [] 13c	Loudspeaker system (LS) diagnosis, troubleshooting	Model 163	**AD82.62-P-5001D**
I 5.12 [] 21a	Loudspeaker system (LS), testing electrical system	Model 208	AD82.62-P-6001B
I 5.12 [] 21b	Loudspeaker system (LS), testing electrical system	Model 168	AD82.62-P-6001C
I 5.12 [] 21c	Loudspeaker system (LS), testing electrical system	Model 163	**AD82.62-P-6001D**

TOOLS, DIAGNOSIS, ANTENNA SYSTEMS (AS) - AD82.62-P-2000-01A

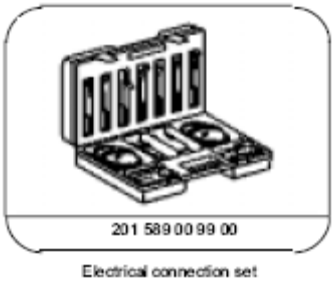


Fig. 132: Identifying Electrical Connection Set (201 589 00 99 00)

Commercially available tools

Number	Designation
WH58.30-Z-1001-09A	Multimeter

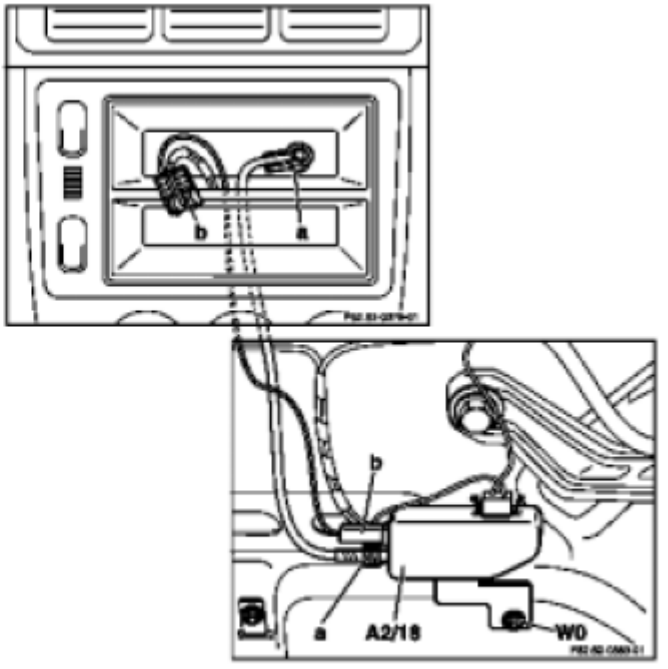
ANTENNA SYSTEM (AS) TEST DIAGRAM - AD82.62-P-2000-02D

Model 163

Test diagram for FM/AM radio/amplifier

Model 163:

a HF connection cable FM/AM amplifier - radio
b Voltage supply from radio, coupling A pin 5 for automatic antenna, FM/AM amplifier and sound system power amplifier
A2/18 FM/AM amplifier
W0 Ground connection and fixing point



P82.62-0375-12

Fig. 133: Antenna System (AS) Test Diagram

ANTENNA SYSTEM (AS) DIAGNOSIS, PREVIOUS KNOWLEDGE - AD82.62-P-2000A

MODELS 163, 168, 202.078 /080 /083 /182 /188, 208 (except, 208.4), 202.01 /02/12 as of 1.1.97, 210.0 /2

GF	Antenna system (AS), location of components	MODEL 208 (except 208.4)	GF82.62-P-0001-03A
		MODELS 202.01/02/12 as of 01.01.97	
		MODELS 202.078/080/083/182/188/210.2	GF82.62-P-0001-03B
		Model 168	GF82.62-P-0001-

		Model 163	03C **GF82.62-P-0001-03D**
		Model 210.0	GF82.62-P-0001-03H
PE	Wiring diagrams	MODEL 202 up to 31.05.97, group 82 Models 202, 208 from 01.06.97 Model 168 Model 163 Model 210	 PE82.00-P-1100D PE82.00-P-1100GC PE82.00-P-1100E PE82.00-P-1100A
	Connecting and using test equipment		**AD00.00-P-1000AZ**
	Tooling diagnosis, antenna system (AS)		**AD82.62-P-2000-01A**
	Checking chart for AS	MODEL 208 except 208.4 MODELS 202.01/02/12 as of 01.01.97 MODELS 202.078/080/083/182/188/210.2 Model 168 Model 163 Model 210.0	AD82.62-P-2000-02A AD82.62-P-2000-02B AD82.62-P-2000-02C **AD82.62-P-2000-02D** AD82.62-P-2000-02F

DIAGNOSTIC TOOLS, LOUDSPEAKER SYSTEM (LS) - AD82.62-P-2001-01A

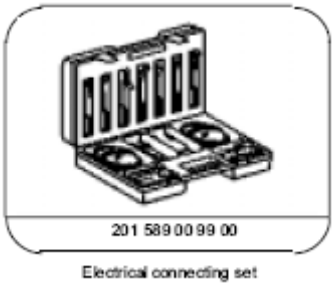


Fig. 134: Identifying Electrical Connecting Set (201 589 00 99 00)

Commercially available tools

Number	Designation
WH58.30-Z-1001-09A	Multimeter
WH58.30-Z-1006-09A	Function generator

COUPLING ASSIGNMENT ON RADIO FOR LOUDSPEAKER SYSTEM (LS) - AD82.62-P-2001-02A

All MB radios

Coupling B

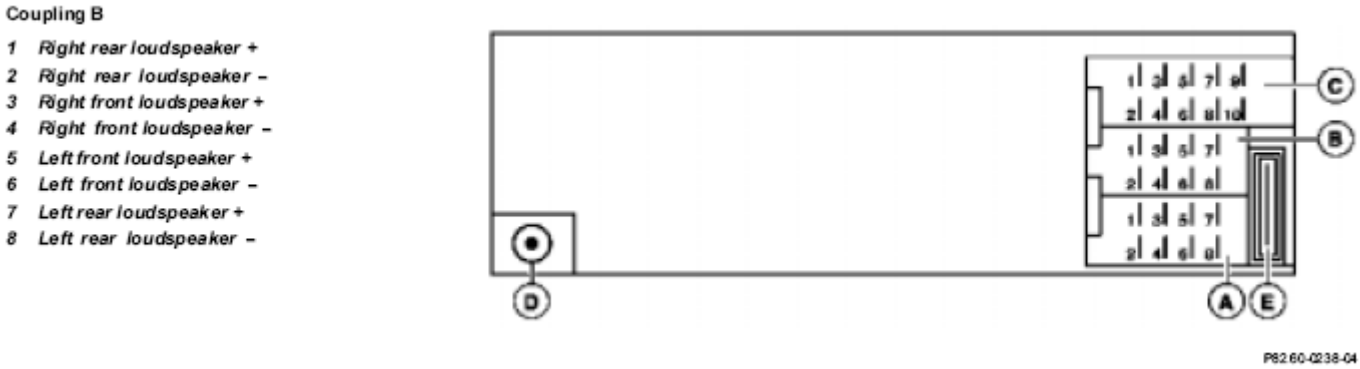


Fig. 135: Identifying Coupling Assignment On Radio For Loudspeaker System (LS)

LOUDSPEAKER SYSTEM (LS) DIAGNOSIS, ADVANCED INFORMATION - AD82.62-P-2001A

MODEL 163 with CODE (491) U.S. version with CODE (259) Radio Premium with Bose sound system

MODEL 163 with CODE (259a) Radio ML 10 with sound system except CODE (491) U.S. version

MODEL 208 with CODE (810) Sound system with MB radio

GF	Loudspeaker system (LS), location of components	Model 208 Model 163	GF82.62-P-0002-01A **GF82.62-P-0002-01E**
PE	Electric wiring diagram, radio with sound system Connection and use of test equipment	Model 208 Model 163	PE82.00-P-1100D PE82.00-P-1100E **AD00.00-P-1000AZ**
	Diagnostic tools, loudspeaker system (LS)		**AD82.62-P-2001-01A**
	Coupling assignment on radio for loudspeaker system (LS)		**AD82.62-P-2001-02A**

LOUDSPEAKER SYSTEM (LS) DIAGNOSIS, ADVANCED INFORMATION - AD82.62-P-2001B

MODEL 163 with CODE (491) U.S. version with CODE (257) Radio Hi-Line

MODEL 163 with CODE (257a) Radio ML 5 except CODE (491) U.S. version

MODEL 168, 208 with MB radio

GF	Loudspeaker system (LS), location of components	Model 208 Model 168 Model 163	GF82.62-P-0002-01B GF82.62-P-0002-01C **GF82.62-P-0002-01D**
PE	Electric wiring diagrams	Model 208 Model 168 Model 163	PE82.00-P-1100D PE82.00-P-1100GC PE82.00-P-1100E
	Connection and use of test equipment		**AD00.00-P-1000AZ**
	Diagnostic tools, loudspeaker system (LS)		**AD82.62-P-2001-01A**
	Coupling assignment on radio for loudspeaker system (LS)		**AD82.62-P-2001-02A**

AM AND FM WAVE BANDS, DIAGNOSIS, FUNCTION CHECK, AS - AD82.62-P-3000-01A

Function check

- Set radio as follows: Set station with poor reception (music) and fader, bass, treble and balance in position 0 (shown in display).
- Check AM and FM wave bands by driving in a circle in a yard (open-air grounds) to establish the reception quality.
- Possibly repeat the test with an identical vehicle for comparison.
- It is absolutely essential to perform the comparison measurement at the **same location** and with the **same station setting** .
- Repeat the test after replacing a component.

ANTENNA SYSTEM (AS) DIAGNOSIS, FUNCTION CHECK - AD82.62-P-3000A

MODELS 163, 168, 202.078 /080 /083 /182 /188, 208 (except, 208.4), 202.01 /02/12 as of 1.1.97, 210.0 /2

	Antenna system (AS) diagnosis, previous knowledge		**AD82.62-P-2000A**
	Operational check		
Test of	**Operation / Requirement**	**Specified value**	**possible cause/ Remedy**

1	AM and FM wavebands diagnosis, AS function check		**AD82.62-P-3000-01A**

LOUDSPEAKER SYSTEM (LS) DIAGNOSIS, FUNCTION CHECK - AD82.62-P-3001A

MODEL all with MB radio

i	• Set station with good reception (music) or play music cassette or CD • Fader, bass, treble and balance in position 0 (shown in display).		
	Function check		
Scope of test	**Operation/Requirement**	**Specified value**	**Possible cause/Remedy**
1 Loudspeaker	Listen to each loudspeaker individually in the respective installed position.		

SPEAKER SYSTEM (LSA) DIAGNOSIS TROUBLESHOOTING - AD82.62-P-5001D

MODEL 163 with CODE (491) U.S. version with CODE (257) Radio Hi-Line

MODEL 163 with CODE (257a) Radio ML 5 except CODE (491) U.S. version

	Loudspeaker system (LS), diagnosis, advanced information		**AD82.62-P-2001B**
	Loudspeaker system (LS), location of components		**GF82.62-P-0002-01D**
	Troubleshooting		
Complaint	**Cause**	**Note**	**Remedy**
Left front door speaker (H4/5) inoperative	Loudspeaker (H4/5) Radio (A2)		**AD82.62-P-6001-02M**
Left rear door speaker (H4/3) inoperative	Loudspeaker (H4/3) Radio (A2)		**AD82.62-P-6001-02O**
Right front door speaker (H4/6) inoperative	Loudspeaker (H4/6) Radio (A2)		**AD82.62-P-6001-02P**
Right rear door speaker (H4/4) inoperative	Loudspeaker (H4/4) Radio (A2)		**AD82.62-P-6001-02R**

SPEAKER SYSTEM (LSA) DIAGNOSIS TROUBLESHOOTING - AD82.62-P-5001E

MODEL 163 with CODE (491) U.S. version with CODE (259) Radio Premium with Bose sound system

MODEL 163 with CODE (259a) Radio ML 10 with sound system except CODE (491) U.S. version

	Loudspeaker system (LS) diagnosis, previous knowledge		**AD82.62-P-2001A**
	LS, location of components		**GF82.62-P-0002-01E**
	Troubleshooting		
Complaint	**Cause**	**Note**	**Remedy**
Loudspeaker system inoperative	Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-01C**
Left rear door speaker (H4/3) inoperative	Left rear door speaker (H4/3) Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-02S** **AD82.62-P-6001-01C**
Right rear door speaker (H4/4) inoperative	Loudspeaker group (H4/4) Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-02T** **AD82.62-P-6001-01C**
Left front door speaker (H4/5) inoperative	Loudspeaker group (H4/5) Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-02U** **AD82.62-P-6001-01C**
Right front door speaker (H4/6) inoperative	Loudspeaker (H4/6) Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-02V** **AD82.62-P-6001-01C**
Acoustimass (R) bass module (H4/17) inoperative	Loudspeaker (H4/17) Amplifier control module (N40/6) Radio (A2)		**AD82.62-P-6001-04A** **AD82.62-P-6001-01C**

	Test of	Gauge/test connection	Operation/ Requirement	Specified value	• Possible cause/ Remedy
1.0	**Radio frequency connecting line FM/AM** amplifier (A2/18) - radio (A2) Continuity Short circuit (screening/ internal cable)		Radio (A2): **OFF** Disconnect cable from radio and FM/AM amplifier, see **MODEL 208 except 208.4, 202.01/02/12:** AD82.62-P-2000-02A **MODELS 202.078/080/083/ 182/ 188, 210.2:** AD82.62-P-2000-02B **Model 168:** AD82.62-P-2000-02C **Model 163:** AD82.62-P-2000-02D **MODEL 210.0:** AD82.62-P-2000-02F	< 10 Ω ∞ Ω	• Cable MODELS 202.078/080/083/182 /188: AD82.62-P-6000-02B

Fig. 136: Radio Frequency Connecting Line, Antenna System (AS) Electrical System Test

VOLTAGE SUPPLY, ANTENNA SYSTEM (AS) ELECTRICAL SYSTEM TEST - AD82.62-P-6000-03A

	Test of	Gauge/test connection	Operation/ Requirement	Specified value	• Possible cause/ Remedy
1.0	**Radio (A2)** Control voltage		Disconnect coupling from FM/AM amplifier (A2/18), see **MODEL 208 except 208.4** **MODELS 202.01/02/12:** AD82.62-P-2000-02A **MODELS 202.078/080/083/ 182/ 188/210.2:** AD82.62-P-2000-02B **Model 168:** AD82.62-P-2000-02C **Model 163:** AD82.62-P-2000-02D **MODEL 210.0:** AD82.62-P-2000-02F Radio (A2): **ON**	11 - 14 V	• Cable • Radio (A2): AD82.60-P-6000A

Fig. 137: Voltage Supply, Antenna System (AS) Electrical System Test

FM/AM AMPLIFIER POWER CONSUMPTION, ANTENNA SYSTEM (AS) ELECTRICAL SYSTEM TEST - AD82.62-P-6000-04A

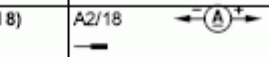
	Test of	Gauge/test connection	Operation/ Requirement	Specified value	• Possible cause/ Remedy
1.0	**FM/AM amplifier (A2/18)** Power consumption	A2/18  A2	Connect ammeter between FM/AM amplifier and voltage supply cable from radio (A2), see **MODELS 208, 202.01/02/12:** AD82.62-P-2000-02A **MODELS 202.078/080/083/ 182/ 188/210.2:** AD82.62-P-2000-02B **Model 168:** AD82.62-P-2000-02C **Model 163:** AD82.62-P-2000-02D **MODEL 210.0:** AD82.62-P-2000-02F Radio (A2): **ON**	**MODEL 163** 54–64 mA **MODEL 168:** 20–24 mA **MODEL 202:** 59–69 mA **MODELS 202.078/080/083/182/188:** 60–72 mA **MODEL 208:** 65–75 mA **MODEL 210:** 52–80 mA	• **MODEL 208 except 208.4** FM/AM amplifier ground connection (A2/18) AD82.62-P-6000-05A • **MODEL 208 except 208.4** Value OK but poor reception quality: Replace FM/AM amplifier (A2/18) as a trial and perform function check according to AD82.62-P-3000A .

Fig. 138: FM/AM Amplifier Power Consumption, Antenna System (AS) Electrical System Test

FM/AM AMPLIFIER GROUND CONNECTION, ANTENNA SYSTEM (AS) ELECTRICAL SYSTEM TEST - AD82.62-P-6000-05A

	Test of	Gauge/test connection	Operation/ Requirement	Specified value	• Possible cause/ Remedy
1.0	**Ground connection** FM/AM amplifier (A2/18)	A2/18	Radio (A2): **OFF** i Do not release attachment at FM/AM amplifier (A2/18). The attachment point of the amplifier simultaneously serves as the ground connection.	< 1 ohms	• Transition impedance at ground connection

ANTENNA SYSTEMS (AS), TESTING ELECTRICAL SYSTEM - AD82.62-P-6000A

MODELS 163, 168, 202.078 /080 /083 /182 /188, 208 (except, 208.4), 202.01 /02/12 as of 1.1.97, 210.0 /2

	Antenna system (AS) diagnosis, previous knowledge		**AD82.62-P-2000A**
i	• Battery voltage 11-14V>		

	• Fuses OK • Radio in order • No damage to the rear window and/or to the rear or side window		
Test step	**Inspecting**		
1	Rear window suppressor capacitor antenna system (AS) electrical system test	except MODELS 163, 210.2	AD82.62-P-6000-01A
2	Radio frequency connecting line, antenna system (AS) electrical system test		**AD82.62-P-6000-02A**
3	Radio frequency connecting line, antenna system (AS) electrical system test	MODELS 202.078/080/083/182/188	AD82.62-P-6000-02B
4	Voltage supply, antenna system (AS) electrical system test		**AD82.62-P-6000-03A**
5	FM/AM amplifier power consumption, antenna system (AS) electrical system test		**AD82.62-P-6000-04A**
6	FM/AM amplifier ground connection, antenna system (AS) electrical system test		**AD82.62-P-6000-05A**

AMPLIFIER CONTROL MODULE TEST ELECTRICS LSA - AD82.62-P-6001-01C

Model 163 with sound system

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Amplifier control module** Radio/loudspeaker (N40/6) Voltage supply **Model 163**	A — N40/6 (V) — H	Disconnect coupling 1 from amplifier control module (N40/6). Radio (A2): **OFF**	11 - 14 V	• Fuse F1/F2 • Ground (right A-pillar) (W29/2) • Cables • Values in order: ⇒1.1
1.1	Control voltage from radio (A2)	A — N40/6 (V) — A1	Disconnect coupling 2 from amplifier control module (N40/6). Radio (A2): **ON**	11 - 14 V	• Cables • Radio (A2) loudspeaker signal AD82.62-P-6001-01D

Fig. 139: Amplifier Control Module Test Electrics LSA

AMPLIFIER CONTROL MODULE TEST ELECTRICS LSA - AD82.62-P-6001-01D

Model 163 with sound system

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Amplifier control module** Radio/loudspeaker (N40/6) Loudspeaker signal from radio (A2) Left front: Right front: Left rear: Right rear: **Model 163**	B12 — N40/6 (V) — B5 B9 — (V) — B6 B10 — (V) — B8 B11 — (V) — B7	Disconnect coupling 2 from amplifier control module (radio/loudspeaker) (N40/6). Radio (A2): **ON** Set loudness control to maximum	>0.2 V ∿ It is permissible for this value not to be reached for a short period	• Cables Radio (A2) AD82.60-P-6000A

Fig. 140: Amplifier Control Module Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02M

Models 163/168

	Scope of test	Measuring equipment/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**Loudspeaker** Left front door speaker (H4/5) **Models 163/168**	6 (B.6) — H4/5 (Ω) — 5 (B.5)	Remove radio (A2) and disconnect coupling B. AD82.62-P-2001-02A	3.5-4.5 Ω	• Cables • Loudspeaker (H4/5) • Values in order: Radio (A2) AD82.60-P-6000A

Fig. 141: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02O

Models 163, 168, 202, 210

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	Left rear door speaker (H4/3) **Models 163, 168, 202, 210**	8 (B.8) — H4/3 (Ω) — 7 (B.7)	Remove radio (A2) and disconnect coupling B. AD82.62-P-2001-02A	3.5–4.5 Ω	• Cables • Loudspeaker (H4/3) • Values in order: Radio (A2) AD82.60-P-6000A

Fig. 142: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02P

Models 163 /168

	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Loudspeaker** Right front door speaker (H4/6) **Models 163 /168**	4 (B.4) — H4/6 (Ω) — 3 (B.3)	Remove radio (A2) and disconnect coupling B. AD82.62-P-2001-02A	3.5-4.5 Ω	• Cables • Loudspeaker (H4/6) • Values in order: Radio (A2) AD82.60-P-6000A

Fig. 143: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02R

Models 163, 168, 202, 210

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	Right rear door speaker (H4/4) **Models 163, 168, 202, 210**	2 (B.2) — H4/4 (Ω) — 1 (B.1)	Remove radio (A2) and disconnect coupling B. AD82.62-P-2001-02A	3.5–4.5 Ω	• Cables • Loudspeaker (H4/4) • Values in order: Radio (A2) AD82.60-P-6000A

Fig. 144: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02S

Model 163 with sound system

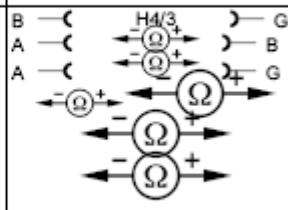
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	● Possible cause/Remedy
1.0	**Loudspeaker** Left rear door (H4/3) **Model 163**		Radio (A2): **OFF** Disconnect coupling 1 from amplifier control module (N40/6).	1.5-2.5 Ω ∞ Ω ∞ Ω	● Cables ● Loudspeaker (H4/3) ● Values in order: Amplifier control module (N40/6)

Fig. 145: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02T

Model 163 with sound system

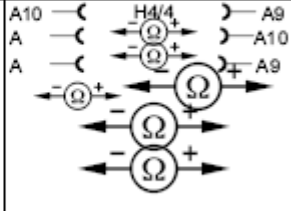
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	● Possible cause/Remedy
1.0	**Loudspeaker** Right rear door (H4/4) **Model 163**		Radio (A2): **OFF** Disconnect couplings 1 and 2 from amplifier control module (radio/loudspeaker) (N40/6).	1.5-2.5 Ω ∞ Ω ∞ Ω	● Cables ● Loudspeaker (H4/4) ● Values in order: Amplifier control module (N40/6)

Fig. 146: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02U

Model 163 with sound system

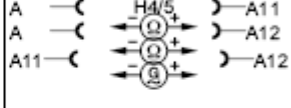
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	● Possible cause/Remedy
1.0	**Loudspeaker** Left front door (H4/5) **Model 163**		Radio (A2): **OFF** Disconnect couplings 1 and 2 from amplifier control module (N40/6). Connect function generator (a change in voltage level results in a change in loudness; a change in frequency results in a change in sound), set a frequency of 100 to 10,000 Hz with a voltage amplitude of approx. 2 V.	∞ Ω ∞ Ω The frequency adjusted at the function generator can be heard over the loudspeakers	● Cables ● Loudspeaker (H4/5) ● Values in order: Amplifier control module (N40/6)

Fig. 147: Speaker Test Electrics LSA

SPEAKER TEST ELECTRICS LSA - AD82.62-P-6001-02V

Model 163 with sound system

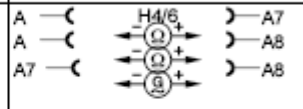
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Loudspeaker** Right front door (H4/6) **Model 163**		Radio (A2): OFF Disconnect couplings 1 and 2 from amplifier control module (N40/6). Connect function generator (a change in voltage level results in a change in loudness; a change in frequency results in a change in sound), set a frequency of 100 to 10,000 Hz with a voltage amplitude of approx. 2 V.	∝ Ω ∝ Ω The frequency adjusted at the function generator can be heard over the loudspeakers	• Cables • Loudspeaker (H4/6) • Values in order: Amplifier control module (N40/6)

Fig. 148: Speaker Test Electrics LSA

LS TEST OF ELECTRICAL SYSTEM BASE SPEAKER - AD82.62-P-6001-04A

Model 163 with sound system

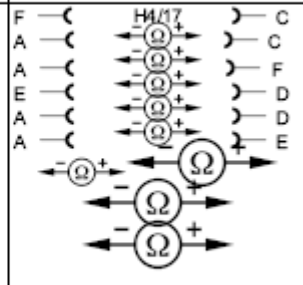
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**Acoustimass (R) bass module** Under left rear seat (H4/17) **Acoustimass (R) bass loudspeaker 1** **Acoustimass (R) bass loudspeaker 2** **Model 163**		Radio (A2): OFF Disconnect coupling 1 from amplifier control module (N40/6).	1.5-2.5 Ω ∝ Ω ∝ Ω 1.5-2.5 Ω ∝ Ω ∝ Ω	• Cables • Acoustimass (R) bass module (H4/17) • Values in order: Amplifier control module (N40/6)

Fig. 149: LS Test Of Electrical System Base Speaker

SPEAKER SYSTEM (LSA) TEST ELECTRICS - AD82.62-P-6001D

MODEL 163 with CODE (491) U.S. version with CODE (257) Radio Hi-Line

MODEL 163 with CODE (257a) Radio ML 5 except CODE (491) U.S. version

	Loudspeaker system (LS) diagnosis, advanced information		**AD82.62-P-2001B**

	• Battery voltage 11-14 V • Fuses in order • Radio in order i Switch off radio for disconnecting and connecting connections and connectors on the radio and loudspeaker system.		
	Testing		
1	Loudspeaker, testing electrical system, LS	Left front door	**AD82.62-P-6001-02M**
2	Loudspeaker, testing electrical system, LS	Left rear door	**AD82.62-P-6001-02O**
3	Loudspeaker, testing electrical system, LS	Right front door	**AD82.62-P-6001-02P**
4	Loudspeaker, testing electrical system, LS	Right rear door	**AD82.62-P-6001-02R**

SPEAKER SYSTEM (LSA) TEST ELECTRICS - AD82.62-P-6001E

MODEL 163 with CODE (491) U.S. version with CODE (259) Radio Premium with Bose sound system

MODEL 163 with CODE (259a) Radio ML 10 with sound system except CODE (491) U.S. version

	Loudspeaker system (LS) diagnosis, previous knowledge		**AD82.62-P-2001A**
i	• Battery voltage 11-14 V • Fuses in order • Radio in order • Loudspeaker for sound system installed i To disconnect and contact connections and connectors on the radio and at the loudspeaker system		

	switch off radio.		
	Testing		
1	Amplifier control module, testing electrical system of LS	Spannungsversorgung	**AD82.62-P-6001-01C**
2	Amplifier control module, testing electrical system of LS	Loud Speaker Signal	**AD82.62-P-6001-01D**
3	Loudspeaker, testing electrical system of LS	Left rear Door	**AD82.62-P-6001-02S**
4	Loudspeaker, testing electrical system of LS	Right rear Door	**AD82.62-P-6001-02T**
5	Loudspeaker, testing electrical system of LS	Left front door	**AD82.62-P-6001-02U**
6	Loudspeaker, testing electrical system of LS	Right Front Door	**AD82.62-P-6001-02V**
7	Acoustimass (R) bass module, testing electrical system of LS	Babbox	**AD82.62-P-6001-04A**

CD PLAYER WITH CHANGER (CDC) DIAGNOSIS, CONTENTS - AD82.64-P-1000AZ

MODEL 124,163,168, 202, 208, 210 with CODE (819) 6-disk CD changer in trunk

MODEL 129 as of 1.6.98 with CODE (819) 6-disk CD changer in trunk

I 6.1 [] 11	CD player with changer (CDC) diagnosis, advanced information		**AD82.64-P-2000A**
I 6.1 [] 12	CD player with changer (CDC) diagnosis, function check		**AD82.64-P-3000A**
I 6.1 [] 13	CD player with changer (CDC) diagnosis, fault memory	Models 129, 202, 208, 210 as of 01.06.98 with CODE (819) 6-disk CD changer in trunk and digital data bus (D2B)	AD82.64-P-4000A
I 6.1 [] 14	CD player with changer (CDC) diagnosis, troubleshooting		**AD82.64-P-5000A**
I 6.1 [] 21	CD player with changer (CDC), testing electrical system		**AD82.64-P-6000A**

TOOLS, TESTING ELECTRICAL SYSTEM, CD PLAYER WITH CHANGER - AD82.64-P-2000-01A

Special tools

Fig. 150: Identifying Electrical Connection Set (201 589 00 99 00)

Commercially available tools

Number	Designation
WH58.30-Z-1001-09A	Multimeter

CD PLAYER WITH CHANGER CONNECTIONS - AD82.64-P-2000-02B

Model 163

Model 163:

Coupling assignment

(A) LF input, right
(B) LF input, left
(C) LF ground
(D) Terminal 30
(E) Terminal 15
(F) Ground
(G) Not assigned
(H) Control line
(J) Control line
(K) Control line

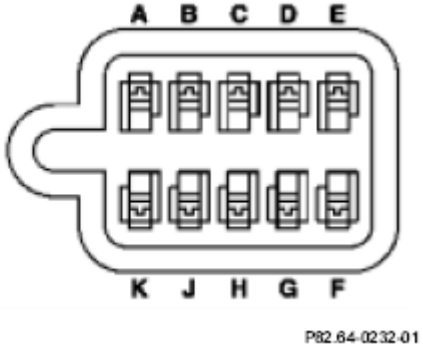


Fig. 151: Identifying CD Player With Changer Connections

CD PLAYER WITH CHANGER (CDC), DIAGNOSIS, PREVIOUS KNOWLEDGE - AD82.64-P-2000A

MODELS 124,163,168, 202, 208, 210 with CODE (819) 6-disc CD changer

MODELS 129 as of 1.6.98 with CODE (819) 6-disc CD changer

GF	CD player with changer, location	Models 124, 129, 168, 202, 208, 210	GF82.64-P-3113-01D
	CD player with changer,	Model 163	**GF82.64-P-3113-01GI**

	location		
PE	Wiring diagrams	Models 202, 208 as of 06/97 Model 210 Model 163 Model 168 Models 124, 129 and Model 202 up to 05/97, Group 82	PE82.00-P-1100D PE82.00-P-1100A PE82.00-P-1100E PE82.00-P-1100GC
	Connecting and using test equipment		**AD00.00-P-1000AZ**
	Tools for checking the electrical system, CD player with changer		**AD82.64-P-2000-01A**
	CD player with changer, connections	Models 202, 208, 210 up to 05/98 and Models 124, 168 Model 163 Models 129, 202, 208, 210 as of 06/98	AD82.64-P-2000-02A **AD82.64-P-2000-02B** AD82.64-P-2000-02C

CD PLAYER WITH CHANGER (CDC) DIAGNOSIS, FUNCTION CHECK - AD82.64-P-3000A

MODEL 124,163,168, 202, 208, 210 with CODE (819) 6-disk CD changer in trunk

MODEL 129 as of 1.6.98 with CODE (819) 6-disk CD changer in trunk

MODEL 638 with CODE (EP5) CD changer

	CD changer (CDC) diagnosis, previous knowledge	Models 124, 129, 163, 168, 202, 208, 210 Model 638: DMNL Vito/V-class, CDC	**AD82.64-P-2000A** AD82.64-S-2000A
i	• Battery voltage 11 - 14 V • Fuses okay • Radio in order • CD magazine of changer fitted with satisfactory CDs free from protective film		
	Function check		
Scope of test	**Operation/Requirement**	**Specified value**	**Possible cause/ Remedy**
1	Radio: **ON**	CD operation must be	**AD82.64-P-5000A**

		faultless	
Function of CD changer in accordance with radio operating instructions	Adjust loudness on radio Perform all operating functions of CD changer		Models 129, 202, 208, 210 with digital data bus (D2B): ? AD82.64-P-4000A

CD PLAYER WITH CHANGER (CDC) DIAGNOSIS, TROUBLESHOOTING - AD82.64-P-5000A

MODEL 124,163,168, 202, 208, 210 with CODE (819) 6-disk CD changer in trunk

MODEL 129 as of 1.6.98 with CODE (819) 6-disk CD changer in trunk

	CD player with changer (CDC) diagnosis, advanced information		**AD82.64-P-2000A**
	Troubleshooting		
Complaint	**Possible cause**	**Note**	**Remedy**
CD player with changer (A2/6) completely inoperative	Voltage supply of CD player with changer (A2/6)	Models 202, 208, 210 up to 05/98 and models 124, 168 Model 163 Models 129, 202, 208, 210 as of 06/98	AD82.64-P-6000-01A &.3.2.(**AD82.64-P-6000-01B**) AD82.64-P-6000-01C
CD player with changer (A2/6), does not load or eject CDs	Single CDs with adapter loaded in CD magazine Adhesive foil on CD has not been removed Voltage supply of CD player with changer (A2/6)	Models 202, 208, 210 up to 05/98 and models 124, 168 Model 163 Models 129, 202, 208, 210 as of 06/98	AD82.64-P-6000-01A &.3.3.(**AD82.64-P-6000-01B**) AD82.64-P-6000-01C
CD player with changer (A2/6) does not respond to controls	CD player with changer (A2/6) Radio (A2)		**AD82.64-P-6000-02A**

VOLTAGE SUPPLY, TESTING ELECTRICAL SYSTEM, CD CHANGER - AD82.64-P-6000-01B

Model 163

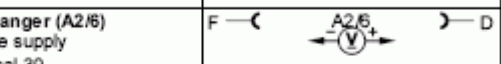
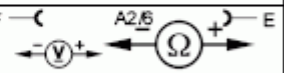
	Scope of test	Measuring instrument/ Test connection	Operation/ Requirement	Specified value	• Possible cause/Remedy
1.0	**CD changer (A2/6)** Voltage supply Terminal 30 **Model 163**		Remove CD changer Disconnect coupling and carry out measurement at coupling Radio: **ON**	10–14 V	• Cables ⇒1.1
1.1	Voltage supply Terminal 15		Remove CD changer Disconnect coupling and carry out measurement at coupling Ignition and radio: **ON**	10–14 V	• Cables • CD changer (A2/6) • Values in order: Radio (A2)↓ AD82.60-P-6000A (DH I/K 3.1 Radio)

Fig. 152: Voltage Supply, Testing Electrical System, CD Changer

OPERATING FUNCTION, TESTING ELECTRICAL SYSTEM, CD PLAYER WITH CHANGER - AD82.64-P-6000-02A

Model 124, 129, 163, 168, 202, 208, 210

	Scope of test	Measuring instrument/ Test connection	Operation/Requirement	Specified value	• Possible cause/Remedy
1.0	**CD player with changer (A2/6)** Operating function **Model 124, 129, 163, 168, 202, 208, 210**		Remove CD changer. Disconnect and reconnect coupling. Ignition and radio: **ON**	Operation is possible again	• Cables • CD player with changer (A2/6)

CD PLAYER WITH CHANGER (CDC), TESTING ELECTRICAL SYSTEM - AD82.64-P-6000A

MODEL 124,163,168, 202, 208, 210 with CODE (819) 6-disk CD changer in trunk

MODEL 129 as of 1.6.98 with CODE (819) 6-disk CD changer in trunk

	CD changer (CDC) diagnosis, advanced information		**AD82.64-P-2000A**
i	• Switch off radio for disconnecting and connecting connectors on the radio and CD changer.		

	• Battery voltage 1114 V • Fuses in order • Radio in order		
	Testing		
1	Voltage supply, testing electrical system, CD changer	Models 202, 208, 210 up to 05/98 and models 124, 168	AD82.64-P-6000-01A
2	Voltage supply, testing electrical system, CD changer	Models 163	**AD82.64-P-6000-01B**
3	Voltage supply, testing electrical system, CD changer	Models 129, 202, 208, 210 as of 6/98	AD82.64-P-6000-01C
4	Operating function, testing electrical system, CD changer		**AD82.64-P-6000-02A**

TESTING & REPAIR

TESTING AND REPAIR WORK: PASSENGER CARS: ELECTRICAL SYSTEM BODY - AR82.00-Z-9163AA

MODEL 163

	Removing and installing bulbs of headlamp unit	MODEL 163.113/136 /154 /172 /174 up to 31.8.01	**AR82.10-P-1201GH**
	Remove/install fog lamp bulb	MODEL 163.113/128 /136 /154 /157 /172 /175 with CODE (U49) Styling package MODEL 163.174	**AR82.10-P-1825GH**
	Remove/install fog lamp bulb	MODEL 163...	**AR82.10-P-1825GI**
	Remove/install headlight beam adjustment control module	MODELS 163.154 /172 /113 with CODE (612b) Xenon headlamp unit MODELS 163.174 /175 /128/157	**AR82.10-P-4081GH**
	Remove/install electric headlamp range adjustment motor	MODEL 163.154 /172 /113 with CODE (612) Xenon headlamp unit MODEL 163.174 /175 /128/157	**AR82.10-P-4082GH**
	Remove/install xenon headlamp control unit	MODEL 163...	**AR82.10-P-4632GH**
	Remove/install xenon headlamp control unit	MODEL 163.113 #X as of 754620, 163.113 /154 /174 #A as of 289565, 163.128 /157 /175	**AR82.10-P-4632GI**
	Remove/install turn signal lamps	MODEL 163...	**AR82.10-P-4725GH**

	Remove/install headlamp unit	MODEL 163.113/128 /136 /154 /157 /172 /174 /175	**AR82.10-P-4730GH**
	Remove/install side wall taillamp	MODEL 163	**AR82.10-P-4920GH**
	Remove/install fog lamp	MODEL 163.113/128 /136 /154 /157 /172 /175 with CODE (U49) Styling package MODEL 163.174	**AR82.10-P-5103GH**
	Remove/install fog lamp	MODELS 163.113/154 #A as of 289565, 163.113 /154 #X as of 754620, 163.128 /157 /175	**AR82.10-P-5103GI**
	Removing and installing license plate lamps	MODEL 163	**AR82.10-P-5161GH**
	Removing and installing center high-mounted stop lamp	MODEL 163	**AR82.10-P-5375GH**
	Remove/install telescoping nozzle for headlamp cleaning system	MODELS 163.113/128 /154 /157 /172 /175 with CODE (600a) Headlamp cleaning system MODEL 163.174	**AR82.15-P-6100GH**
	Removing and installing front dome lamp	MODEL 163	**AR82.20-P-0110GH**
	Remove/install rear dome lamp	MODEL 163.113/128 /136 /154 /157 /172 /174 /175	**AR82.20-P-0113GH**
	Remove/install front overhead control panel	MODEL 163.113/128 /136 /154 /157 /172 /174 /175	**AR82.20-P-1100GH**
	Removing and installing wiper arm	MODEL 163.113/128 /136 /154 /157 /172 /174 /175	**AR82.30-P-6100GH**
	Remove/install wiper system	MODEL 163.113/128 /136 /154 /157 /172 /174 /175	**AR82.30-P-6400GH**
	Removing and installing wiper motor	MODEL 163	**AR82.30-P-6800GH**
	Removing and installing rear window wiper motor	MODEL 163	**AR82.30-P-6900GH**
	Removing and installing tailgate wiper arm	MODEL 163	**AR82.30-P-6910GH**
	Remove/install	MODELS 163.113/128 /154 /157 /172 /174 /175	**AR82.30-P-**

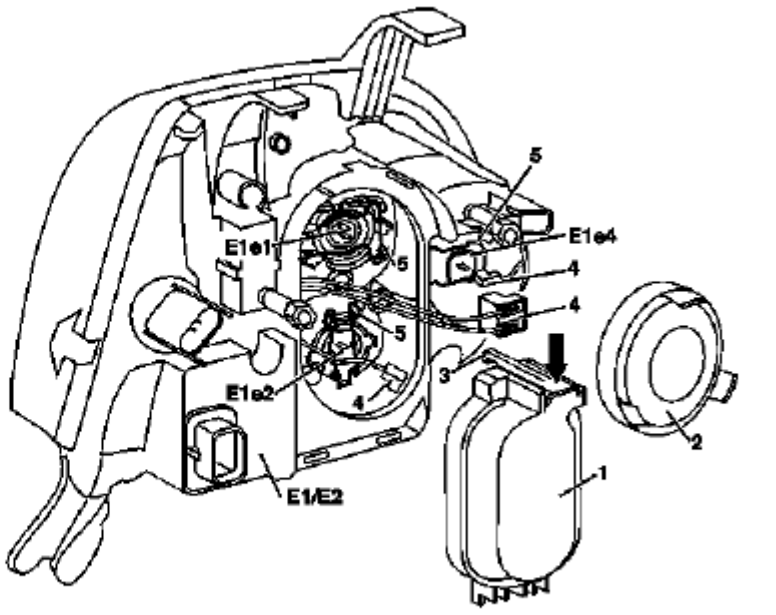
	rain sensor	with CODE (345a) Rain sensor	**7700GH**
	Removing and installing washer fluid reservoir of windshield washer system	MODEL 163.113/128 /136 /154 /157 /172 /174 /175 with 7.6 L reservoir	**AR82.35-P-6000GH**
	Remove/install radio	MODEL 129, 163, 168, 170, 202, 208, 210, 414,463...	**AR82.60-P-7502EA**
	Removing and installing CAN bus adapter	MODEL 163 with CODE (353) Audio 30 APS	**AR82.61-P-7413G**
	Remove/install antenna for global positioning system (GPS) on vehicles with APS	MODEL 163...	**AR82.61-P-7474GI**
	Check microphone for sound amplifier	MODELS 163.113/154 /174 #A as of 289565, 163.128 /157 /175 with CODE (810) Sound system	**AR82.62-P-1110GH**
	Removing and installing microphone	MODEL 163...	**AR82.62-P-7700GH**
	Remove/install loudspeaker amplifier control module	MODELS 163.113/128 /136 /154 /157 /172 /175 with CODE (810) Sound system MODEL 163.174	**AR82.62-P-7720GH**
	Remove/install speaker in the side paneling (rear)	MODEL 163...	**AR82.62-P-7837GH**
	Remove/install woofer	MODELS 163.113/128 /136 /154 /157 /172 /175 with CODE (810) Sound system MODEL 163.174	**AR82.62-P-7839GH**
	Removing and installing loudspeakers in front doors	MODEL 163	**AR82.62-P-7845GH**
	Remove/install front door speakers in mirror triangle	MODEL 163...	**AR82.62-P-7850GH**
	Removing and installing loudspeakers in	MODEL 163	**AR82.62-P-7874GH**

	rear doors		
	Remove, install AM/FM amplifier	MODEL 163	**AR82.62-P-8347GH**
	Replace fiber optical cable (D2B) between radio and sound amplifier (after testing)	MODEL 163...	**AR82.62-P-8350GH**
	Remove/install CD player with changer	MODEL 163 with CODE (819) 6-disc CD changer	**AR82.64-P-7507GH**
	Fiber optical cable (D2B) replace complete (after testing)	MODEL 163...	**AR82.70-P-0005GH**
	Fiber optical cable (D2B) replace complete (after testing)	MODEL 163...	**AR82.70-P-0005GI**
	Fiber optical cable (D2B) replace complete (after testing)	MODEL 163...	**AR82.70-P-0005GJ**
	Remove/install antenna splitter	MODEL 163.113/136 /154 /157 /172 /174	**AR82.70-P-8953GH**
	Remove/install electronic compass	MODEL 163...	**AR82.85-P-7371GH**
	Remove/install control module for E-Call emergency call system	MODEL 163...	**AR82.95-P-0008GH**
	Replace fiber optical cable (D2B) between the radio and E-call control module/CTEL [TEL] interface (after testing)	MODEL 163...	**AR82.95-P-0015GH**

REMOVING AND INSTALLING BULBS OF HEADLAMP UNIT - AR82.10-P-1201GH

MODEL 163.113 /136 /154 /172 /174 up to 31.8.01

1	Cover
2	Cover
3	Catch lever
4	Electrical connector
5	Retaining clip
E1e1	High beam bulb
E1e2	Low beam bulb
E1e4	Fog lamp bulb
E1	Left headlamp unit
E2	Right headlamp unit



P82.10-0739-06

Fig. 153: Identifying Headlamp Unit Bulbs Components

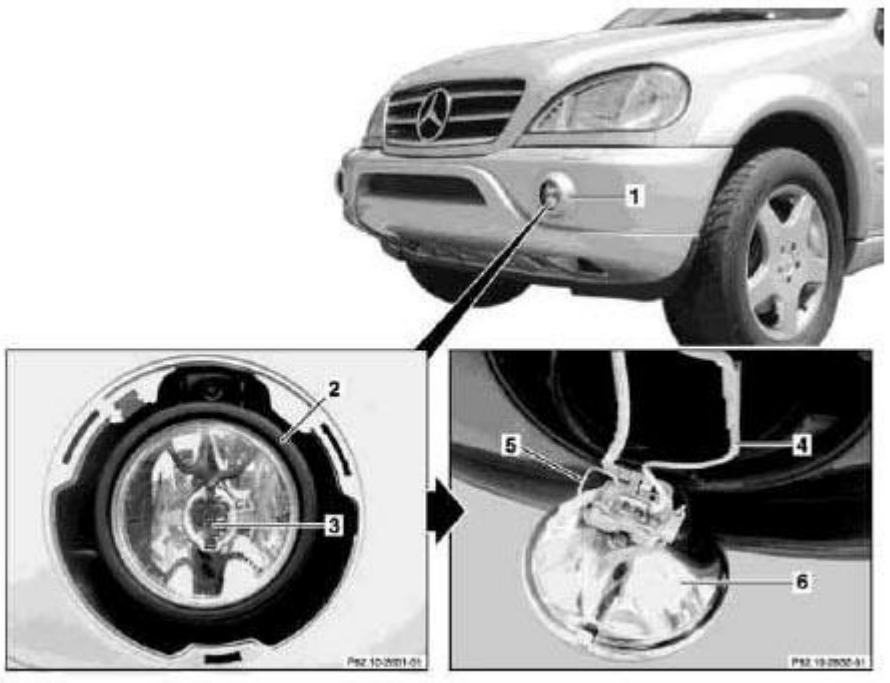
	Remove/install		
1	Open hood and raise to vertical position	Up to 31.08.99 As of 01.09.99	**AR88.40-P-1000GH** **AR88.40-P-1000GI**
2	Release cover (1) by pressing on catch lever (3, direction of arrow) and remove		
3	Remove cover (2)		
4	Disconnect electrical connectors (4) for bulbs		
5	Open retaining clips (5) for bulbs		
6	Remove bulbs (E1e1, E1e2, E1e4)	Do not touch bulbs with bare fingers, use grease-free, soft cloth. **Installation:** Ensure bulb is correctly installed.	
7	Install in the reverse order		
8	Perform function check		

REMOVE/INSTALL FOG LAMP BULB - AR82.10-P-1825GH

MODEL 163.113/128/1 /154 /157 /172 /175 with CODE (U49) Styling package

MODEL 163.174

1 Cover
2 Bulb housing
3 Bulb
4 Connector
5 Locking mechanism
6 Fog lamp insert



P82.10-2833-06

Fig. 154: Identifying Fog Lamp Components

	Remove/install		
1	Remove cover (1) from bumper	Do not break retaining lugs.	
2	Remove bulb housing (2)	To unlock, rotate counterclockwise. **Installation:** Ensure that the locking device has locked securely.	
3	Remove fog lamp insert (6) from housing	Installation wedge	**Fig. 155**
4	Disconnect connector (4)		
5	Remove bulb on the back of the fog lamp insert (6)	Do not hold the bulb with bare fingers, as fingerprints bake and leave behind opaqueness on the bulb. Use a soft, lint-free cloth. Lock securely.	
6	Install in the reverse		

	order		

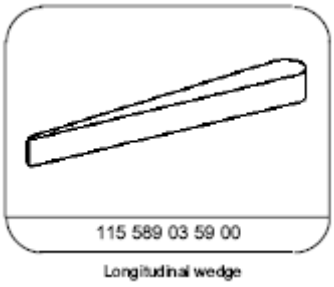


Fig. 155: Identifying Longitudinal Wedge (115 589 03 59 00)

REMOVE/INSTALL FOG LAMP BULB - AR82.10-P-1825GI

MODELS 163.113 #A as of 289565, 163.113 #X as of 754620, 163.154 #A as of 289565, 163.154 #X as of 754620, 163.128/157/175

1 *Fog lamps*
2 *Bulb with plug*

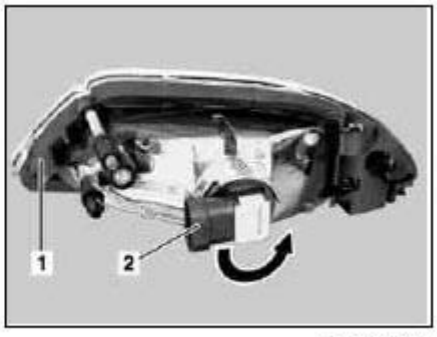


Fig. 156: Identifying Fog Lamp Bulb Components

	Remove/install		
1	Remove fog lamp (1)		**AR82.10-P-5103GI**
2	Remove bulb with plug (2)	Do not hold the bulb with bare fingers, as fingerprints bake and leave behind opaqueness on the bulb. Use a soft, lint-free cloth. To unlock, rotate counterclockwise. The bulb and plug are one unit.	
3	Install in the reverse order		

REMOVE/INSTALL HEADLIGHT BEAM ADJUSTMENT CONTROL MODULE - AR82.10-P-4081GH

MODELS 163.154 /172 /113 with CODE (612b) Xenon headlamp unit

MODELS 163.174/175/128/157

N71 *Headlamp range adjustment control module*

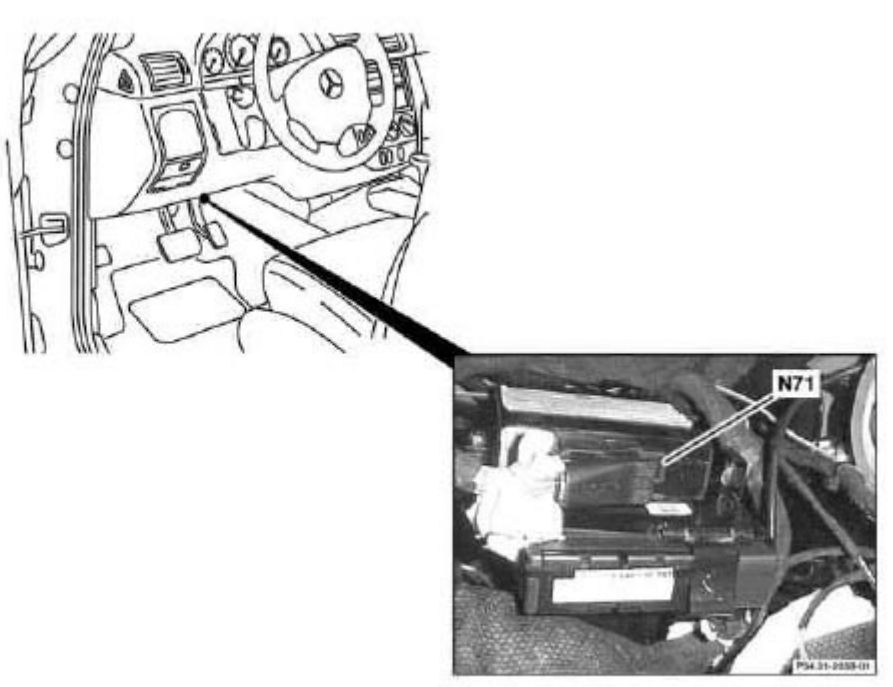


Fig. 157: Identifying Headlight Beam Adjustment Control Module

	Remove/Install		
1	Remove cover below instrument panel (left)		**AR68.10-P-1500GH**
2	Disconnect connector from headlamp range adjustment control module (N71)		
3	Unscrew headlamp range adjustment control module from mount of extended activity module (EAM)	i 2 nuts.	
4	Remove headlamp range adjustment control module (N71)		
5	Install in the reverse order		
6	Adjust headlamp into zero position using STAR DIAGNOSIS		

7 AP	Inspect headlamp adjustment, correct if necessary. Check and correct headlamp adjustment		**AP82.10-P-8260GH**

REMOVE/INSTALL ELECTRIC HEADLAMP RANGE ADJUSTMENT MOTOR - AR82.10-P-4082GH

MODEL 163.154 /172 /113 with CODE (612) Xenon headlamp unit

MODEL 163.174/175/128/157

E1 Left front lamp unit
E1m1 Left headlamp range adjustment motor
E2 Right front lamp unit
E2m1 Right headlamp range adjustment motor

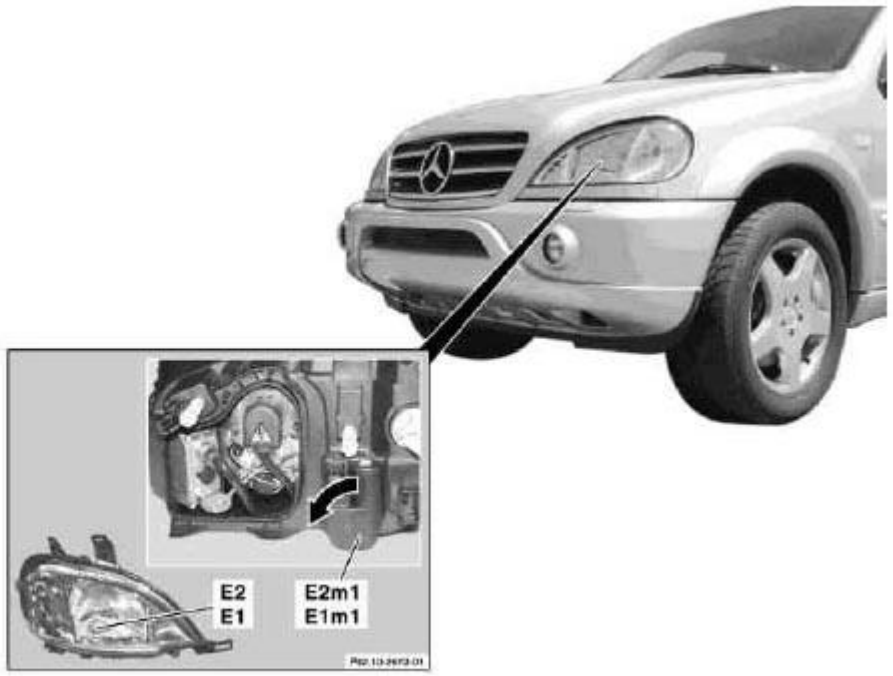


Fig. 158: Identifying Electric Headlamp Range Adjustment Motor Components

	Remove/install		
Danger!	**Risk of death** caused by high voltage levels present at xenon headlamps. **Risk of explosion/fire hazard** through highly flammable material in the area of damaged xenon bulbs **Risk of injury** through	Do not come into contact with parts that are under high voltage. Persons with **active electronic implants** (e.g. heart pacemakers) must never work on xenon headlamps. Switch off complete lighting system. Wear insulating safety shoes, safety glasses and	**AS82.10-Z-0001-01A**

	UV light, hot components on xenon headlamps and glass splinters when xenon bulbs burst **Risk of poisoning** through inhalation of mercury vapor and swallowing of or skin contact with toxic salts and mercury compounds	protective gloves. Remove highly inflammable materials from the hazard area. Ensure that the workplace is sufficiently ventilated.	
1	Remove left front lamp unit (E1) or right front lamp unit (E2)		**AR82.10-P-4730GH**
2	Remove cover from rear of lamp unit		
3	Turn left headlamp range adjustment motor (E1m1) or right headlamp range adjustment motor (E2m1) to right and remove from left front lamp unit (E1) or right front lamp unit (E2)	i Left side: 1/4 clockwise rotation. Right side: 1/4 counterclockwise rotation.	
4	Unhook adjusting support and remove left headlamp range adjustment motor (E1m1) or right headlamp range adjustment (E2m1)		
5	Install in the reverse order		
6	Set headlamps to zero position using STAR DIAGNOSIS		
7 AP	Inspect headlamp adjustment, correct if necessary. Check and correct headlamp adjustment		**AP82.10-P-8260GH**

REMOVE/INSTALL XENON HEADLAMP CONTROL UNIT - AR82.10-P-4632GH

MODEL 163.113 #X up to 754619, 163.113 /154 #A up to 289564, 163.172 with CODE (612) Xenon

headlamp unit

MODEL 163.174 #A up to 289564

1	Connector
2	Connector
E1	Left front lamp unit
E2	Right front lamp unit
E1n1	Xenon headlamp control unit
E2n1	Xenon headlamp control unit

P82.10-2875-06

Fig. 159: Identifying Xenon Headlamp Control Unit Components

	Remove/install		
Danger!	**Risk of death** caused by high voltage levels present at xenon headlamps. **Risk of explosion/fire hazard** through highly flammable material in the area of damaged xenon bulbs. **Risk of injury** through UV light, hot components on xenon headlamps and glass splinters when xenon bulbs burst. **Risk of poisoning** through inhalation of mercury vapor and	Do not come into contact with parts that are under high voltage. Persons with **active electronic implants** (e.g. heart pacemakers) must never work on xenon headlamps. Switch off complete lighting system. Wear insulating safety shoes, safety glasses and protective gloves. Remove highly inflammable materials from the hazard area. Ensure that the workplace is sufficiently ventilated.	**AS82.10-Z-0001-01A**

	swallowing of or skin contact with toxic salts and mercury compounds.		
1	Remove left front lamp unit (E1) or right front lamp unit (E2)		**AR82.10-P-4730GH**
2	Remove cover from rear of lamp unit		
3	Detach plug (1, 2) on xenon headlamp control unit(E1n1, E2n1)	i Turn connector 1/4U turn counterclockwise.	
4	Remove xenon headlamp control unit (E1n1, E2n1)	i Carefully press control unit off of mount using long wedge Long wedge	**Fig. 155**
5	Install in the reverse order		
6	Set headlamps to zero position using STAR DIAGNOSIS		
7 AP	Inspect headlamp adjustment, correct if necessary. Check and correct headlamp adjustment		**AP82.10-P-8260GH**

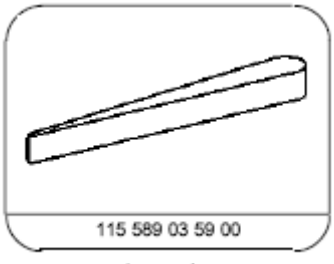


Fig. 160: Identifying Long Wedge (115 589 03 59 00)

REMOVE/INSTALL XENON HEADLAMP CONTROL UNIT - AR82.10-P-4632GI

MODEL 163.113 #X as of 754620, 163.113 /154 /174 #A as of 289565, 163.128/157/175